HOW PEOPLE ARE POSITIONED IN SPACE: SEAT CHOICE AND ORIENTATION.

by

MELISA CHING SIAN CHAN

The Bartlett School of Graduate Studies
University College London

A thesis submitted in part fulfilment of the degree of Master of Science Built Environment: Advanced Architectural Studies

University of London
14 September 2007

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

UCL FACULTY OF THE BUILT ENVIRONMENT
BARTLETT SCHOOL OF GRADUATE STUDIES
MSC ADVANCED ARCHITECTURAL STUDIES

MSc Advanced Architectural Studies
Thesis Report Submission Form

A signed and dated copy of the following MUST be inserted after the title page of the hard copy version of your thesis report. If you fail to submit this statement duly signed and dated, your submission will not be accepted for marking.

1. DECLARATION OF AUTHORSHIP

I confirm that I have read and understood the guidelines on plagiarism, that I understand the meaning of plagiarism and that I may be penalised for submitting work that has been plagiarised.

I certify that the work submitted is my own and that it has been also submitted electronically and that this can be checked using the JISC detection service, Turnitin®.

I understand that the work cannot be assessed unless both hard copy and electronic versions of the work are handed in, along with electronic copies of drawings, maps and photographs.

I declare that all material presented in the accompanying work is entirely my own work except where explicitly and individually indicated and that all sources used in its preparation and all quotations are clearly cited.

Should this statement prove to be untrue, I recognise the right of the Board of Examiners to recommend what action should be taken in line with UCL's regulations.

2. COPYRIGHT

The copyright of this report remains with me as its author. However, I understand that a copy may be given to my funding body (alongside limited feedback on my academic performance). A copy may also be given to any organisation which has given me access to data and maps (if requested and if appropriate).

I also understand that a copy may be deposited in the UCL E-prints public access repository and copies will be available on the UCL library bookshelves.

Please write your initials in the box if you DO NOT want this report to be made available publicly either electronically or in hard copy. ☐

Name: MELISA CHAN

Signed: _____

Date: 14. SEPTEMBER 2007

Abstract

How do people position themselves in space? A theoretical and empirical approach emphasises inter-visibility over cultural norms as a means by which people assess their perceived environment. The micro-study of the properties of a bar-space reveals a spatial dimension to individual, as well as, small group behaviour. Visual relations of co-present people, architectural features and (fixed and movable) furniture are employed to explain positioning and orientation behaviour ecologically at a local interior scale. This paper comprises of three sections: theoretical framework, analytical models and finally, observation analysis, that comment on the manner in which people make seat choices in a semi-public situation. Existing behavioural research is reviewed and their underlying theoretical basis is weighed against this paper's aims. Opposing views in environment and spatial theories, methodology and tested findings, are discussed. Spatial models, particular visibility analysis, is investigated and backed by a theoretical approach to space that emphasises a visual perceptive logic. The spatial analysis and observed behaviour (from video recorded footage) is then compared to substantiate this study's theoretical assertions.

Contents

Contents (cont'd) Page.

List of illustrations

Fig 11. Seated point isovist 26. Refer to Appendix B for the full set of façade, standing and seated isovists generated for each seat code in the system.

Fig 12. Sample of isovist areas in descending order.

Fig 13. Visual Connectivity measure of the full bar and restaurant model.

Fig 14. Visual IntegrationHH measure of the full bar and restaurant model. The white arrow indicates the only concentration of high integration, while the orange arrows point to patches of intermediate visual integration.

Fig 15. Visual Control measure of the full bar and restaurant model.

Fig 16. Visual Controllability measure of the full bar and restaurant model.

Fig 17. Visual Connectivity measure of the bar (including exterior) model; Fig 17.1. (left) model follows the line of the sidewalk kerb and Fig 17.2. (right) has a radial visual field of the exterior area through the glazing.

Fig 18. Visual Integration measure of the bar (including exterior) model; Fig 18.1. (left) model follows the line of the sidewalk kerb and Fig 18.2. (right) has a radial visual field of the exterior area through the glazing. The white arrow indicates the only concentration of high integration, while the orange arrows point to patches of intermediate visual integration.

Fig 19. Visual Control measure of the bar (including exterior) model; Fig 19.1. (left) model follows the line of the sidewalk kerb and Fig 19.2. (right) has a radial visual field of the exterior area through the glazing.

List of illustrations (cont'd)

List of illustrations (cont'd)

List of illustrations (cont'd)

List of illustrations (cont'd)

List of illustrations (cont'd)

List of illustrations (cont'd)

Acknowledgements

The author would like to thank the management and staff of the Lazy Dog Bar, St. Giles Hotel, London, especially George and Selena, who have been encouraging and accommodating throughout the duration of the observation sessions; Matthew Bowles, The Bartlett School of Architecture AV officer for the flexible and generous loaning of filming equipment; Mike Lott (Ravensbourne College of Design and Communication IT department) for the technical advice and loan of computer equipment; Dr. Ruth Conroy-Dalton for her encouragement and invaluable guidance; professors, tutors and colleagues for their support and assistance in the completion of this project.

1. Introduction

1.1. Background

Space Syntax techniques have had considerable success in analysing and predicting spatial properties at a complex architectural and urban level; at the other end of the scale, studies in cognition link the generative urban form to how people perceive the built environment and navigate it effectively. As two ends of the spectrum (the study of perceptive mechanisms and of global urban morphology) advance towards each other, a limited amount of work has been done on spatiality at a human scale that addresses the relationship between spatial perception and the built environment at a simple interior scale.

Although extensive space syntax work has been undertaken on the spatial properties of museum design that involves a configuration of multiple spaces, little research has been done on the socio-spatiality of a 1-room space in architectural studies. Research investigating human-environment relationships has been dominated by theoretical and practical studies in the fields of sociology and psychology that do not seem to regard spatial properties of the built-*space* as important to the discussion.

From the viewpoint of an interior designer, this author recognises the implications of an immediate interior environment on human behaviour and sociability. The success of a design in stimulating and accommodating its users affects individuals' emotions and the overall sociability of the place, thus, positively affecting its popularity with customers and revenue capacity. Therefore, this paper aims to investigate the nature of human behaviour in a social situation through a series of spatial methods and observation fieldwork to determine the suitability of spatial theories and analysis in discussing behaviour.

Essentially, this paper asks the overriding question: How do people position themselves in space? It asks: Why is there a need for a spatial view of sociability when there is research already undertaken on human sociability in other fields? Therefore, what is the role of spatial theory in explaining human behaviour and how does this translate into a demonstrable and straightforward approach?

In the light of previous research and varying literature that focuses on aspects of human behaviour in relation to its environment (which may or may not be considered spatial), this paper comments on the debate between opposing theories of human behaviour - Environmental Psychology, Ecological Psychology, Space Syntax and branches of Sociology, at the scale of small-groups, questioning the validity of these claims. Particularly, how can this study add to or refute studies at the level of small-group behaviour in an interior social setting?

This study investigates the theoretical basis of Space Syntax methodology aiming to draw relations between the theory, its alternative to the man-environment paradox, its analytical models and finally how these components work together to propose a (spatial) theoretical framework to study sociability on a practical level. The site-specific milieu of the hotel bar is addressed: Are there patterns in the observed happenings of the hotel bar, and do the philosophies mentioned account for the characteristics and the patterns found (if any) within this specifically social (and arguably spatial) situation?

Focusing on the relationship between perception and visibility, which of the Space Syntax measures best describes people's preferences/ behaviour (and therefore, an insight into determinants of human perception). For example, does seat-choice depend on fixed or movable furniture, or being in the most visually integrated position?

From the select literature reviewed on published studies, Mehrabian (1971) and his psychology associates have addressed similar concerns as this study; in one paper, they ask the extremely pertinent questions,

> "How does a given furniture arrangement affect social interaction? Given a specific furniture arrangement, what induces a person to choose a particular seat? This second question also relates to individual differences in preference for various arrangements; [and] why do people differ in the ways they arrange their furniture?" (Mehrabian and Diamond, 1971, p. 281).

Finally, what happens when a particular layout is unnaturally altered? Does an optimum seating layout exist ("best" design as opposed to bad design); therefore, what are the properties and theoretical basis on which it is constructed?

1.2. Theoretical Framework

1.2.1. Existing Research

A review of studies similar to the current discussion revealed a number of findings; Ittelson and Proshansky (1974) assert, at a basic level, "the physical arrangement of the setting can affect the actual group process"; in environmental psychology terms, "the willingness to compromise, the ability to see another point of view, in some measure depends on feeling that one has equal opportunity, that others whose views one is trying to share can be seen" (ibid, p. 137).

Studies have found "a less directly facing orientation would decrease involvement and increase discomfort in small group discussions" (Patterson, Kelly, Kondracki and Wulf, 1979, p. 183) [1] favouring circle-orientation than L-shape configurations. Although surprisingly higher levels of positive postulations and interaction behaviour was recorded, they explain that this "seeming paradox" in nonfacing orientation puts the group members at a disadvantage in easily interacting with one another" and increased animated conversation and gesticulation to overcompensate for physical limitations. Patterson and associates (ibid) state "a non-facing orientation makes easy visual access among group members more difficult, which in turn probably effects transitions in conversational sequencing" (ibid, pp. 183-184) predetermining who people in the group can communicate with visually and verbally.

They make a valid comment that "while the L-shape orientation in this study may seen a little unusual, there are frequent instances of similar or even more extreme non-facing orientations in many everyday settings. Straight-line orientations are common in waiting areas of offices, train and bus stations, and airports (Sommer, 1974). Even many living rooms or family rooms are arranged

[1] In Steinzor's experiments with circular groups of ten members, orientation within the group was found to influence behaviour, "when a person stopped speaking, someone opposite rather than alongside was next to speak" (Ittelson and Proshansky, 1974, p. 137). Steinzor asserts "'opposites' have greater physical and expressive value for one another than 'side-by-sides'"(ibid, p. 137).

so that the majority of individuals using these areas are required to site in a row on a sofa or couch. It seems likely that individuals desirous of interaction are often put at a disadvantage by such [arrangement preconceptions]" (Patterson, Kelly, Kondracki and Wulf, 1979, pp. 183-184).[2]

Ittelson and Proshansky qualify that although "seating arrangements unquestionably encourage specific interaction patterns... in themselves seating arrangements cannot cause or create communication" (ibid, p. 137).[3] Here, Ittelson and Proshansky reveal environmental psychology's causal approach to the man-environment relationship.

Batchelor and Goethals (1972) approached the space-behaviour relation from the opposite direction, hypothesising that "the function of a group would affect the spatial arrangements of the members" (ibid, p. 270). Their results showed "smaller interpersonal distances and greater visual contact in the groups making collective decisions" than in individual completion of tasks (ibid, p. 270).[4] According to Batchelor and Goethals (ibid.), the two main factors explaining person-to-person interaction are "distance and eye contact"; they cite Hall (1966) as having "analyzed the distances used for different kinds of interaction and defined four ranges of interpersonal distance: intimate, personal, social, and public"(ibid, 1972, p. 270).

---

[2] Another factor, less relevant to this study, is the influence of table shape on informal groups. According to Ittelson and Proshansky (1974), a round table implies equality among participants while positions around a rectangle table holds more differentiated meanings. For example, "the head of the table" is a manifestation of symbolic domination (Ittelson and Proshansky, 1974, p. 138). Intuitively, this symbolic manifestation implies a spatial dominance based on the ability to have visual advantage over others. Space syntax theory discusses this phenomenon in spatial terms, attributing "power" to those in controlling and integrated positions, including seated positions at a table (Hillier and Hanson, 1984, et al.)

[3] Environmental psychologist over-emphasis on "causal" explanations for the socio-spatial relationship is discussed as being flawed. According to Ittelson and Proshansky (1974), seating arrangements are not the direct *cause* of interaction; however, this paper suggests that seating position and arrangement at an ecological level is paramount in the investigation of an individual's perceived control over the space.

[4] The terms "Collective Decision" and Individual Decision" groups are used in Batchelor and Goethals' (1972) study to refer to the criteria of the experiment in which subjects were asked to make decisions *individually* or engage with each other in discussion to come to a *collective* decision on a specific task. Volunteers for the study were given the task of reading the "case history of a juvenile delinqient" to decide the most appropriate manner of rehabilitation from seven alternatives; "the experiment was presented as research on the differences between group decisions and individual decisions" (Batchelor and Goethals, 1972, p. 272).

Sommer (1961, 1962) is cited in both Batchelor and Goethals (1972), and Mehrabian and Diamond (1971) as discovering an "upper limit (5.5 feet) for dyadic conversation in a semi-public setting" (Batchelor and Goethals, 1972, p. 270; Mehrabian and Diamond, 1971, p. 281). and additionally, "subjects prefer to be sitting at an angle" (Batchelor and Goethals, 1972, p. 270). [5]

Notably, furniture is not predetermined; subjects collect chairs as they enter the room and choose where to place themselves in relation to the room and to those already present (illustrated in Fig 1.-2.). In terms of a quantifiable model of interpersonal distances in larger groups, a "grid diagram" corresponding to floor tiling is constructed. From this, "Distances were measured from the center of the front of the chairs, a measure which is comparable Sommer's "nose-to-nose" distances" (ibid, p. 272).[6] A following technique, "distance to the nearest person" was measured as an average distance to the nearest person from each position of those present.

Visual contact was estimated by the number of chairs/participants situated within 180^0 radius of visibility, "this arc being an estimate of the visual field that can be scanned by turning the head"; the 180^0 line originating in the middle of the two points that represent the "front legs of the chair" (ibid, p. 72).[7]

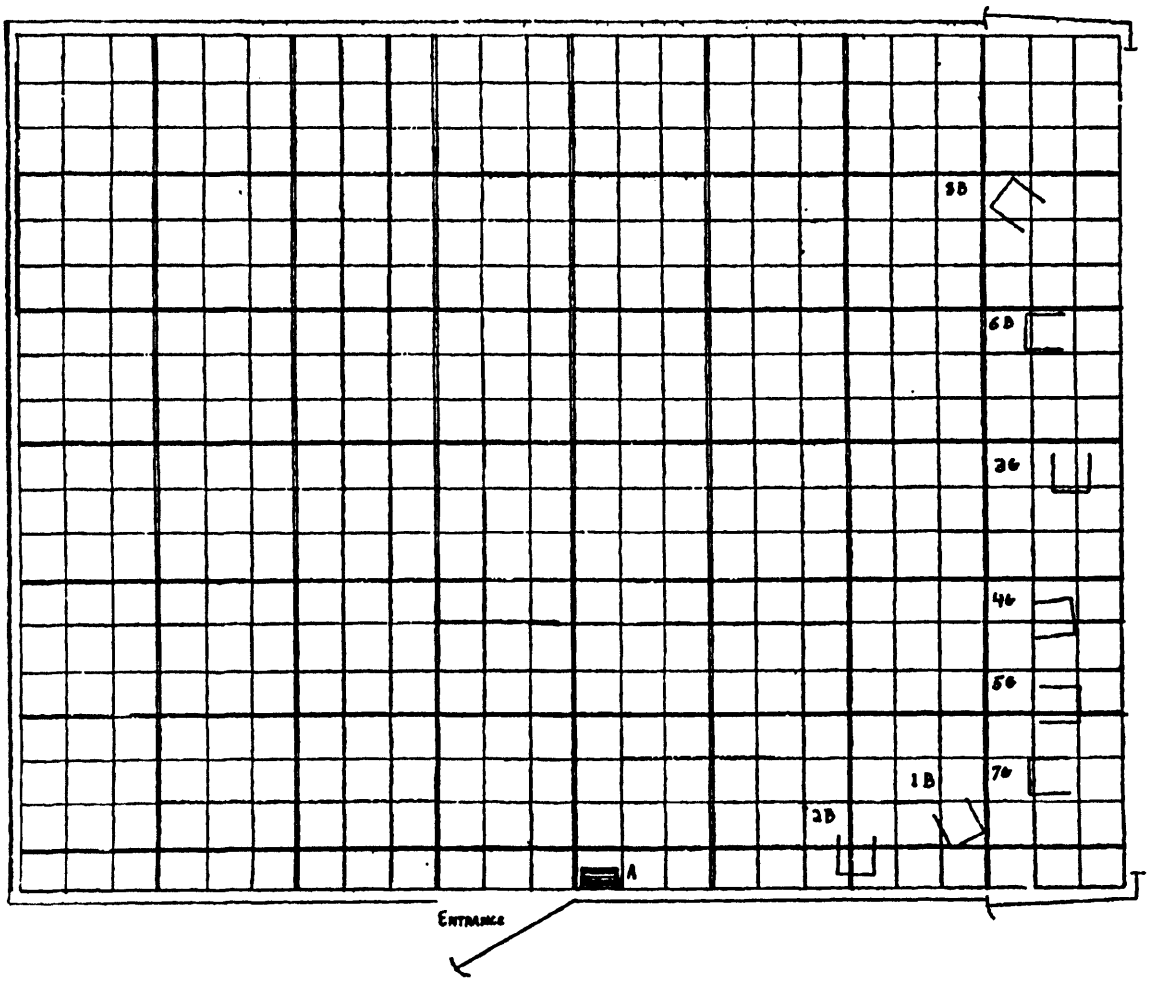
---

[5] Mehrabian adds that configurations that fall out of the Sommer's 5.5 inches inter-person range are "expected to inhibit conversation or, at least, be uncomfortable for the interactants" (Mehrabian and Diamond, 1971, p. 281).

[6] The experiment recorded "in a group of 8 persons there are 28 interpersonal distances. The total of these 28 distances gives an indication of the size of the group – the higher the score, the more the dispersion" (Batchelor and Goethals, 1972, p. 272). According to Batchelor and Goethals (1972), "although there was considerable variance in the size of Individual Decision groups, there was surprisingly little variance in the distances between subjects in the same group. The results strongly suggest the existence of norms for spatial arrangements" (Batchelor and Goethals, 1972, p. 270).

[7] The "visual contact" experiment recorded "the average number of persons falling within a 180^0 arc ranged from 4.0 to 6.0 persons (mean = 5.2 persons) for [subjects] in the Individual Decision groups and from 5.75 to 6.75 persons (mean = 6.5 persons) in the Collective Decision groups" (Batchelor and Goethals, 1972, p. 274) and that "seven person as the maximum number a subject could see" (ibid, p. 274). Substantial interest in the mythologies of "the magic number seven" (Milller, 1956) suggest the number is the maximum that makes a cohesive group, before the group breaks into smaller sub-sections to manage people numbers and interaction. Additionally, the average human mind can also recall up to 7 items manageably, having more problems with 8 or more sequences (Miller, 1956, et al.). This implies a perceptual basis for the maximum containment of information by human cognition that surrounds maximum values of seven. Argyle notes similar instances when "a number of people are present in a social situation, the group often divides up into smaller groups... even in groups of three, a sub-group of two may separate off" (Argyle, 1978, p. 238).

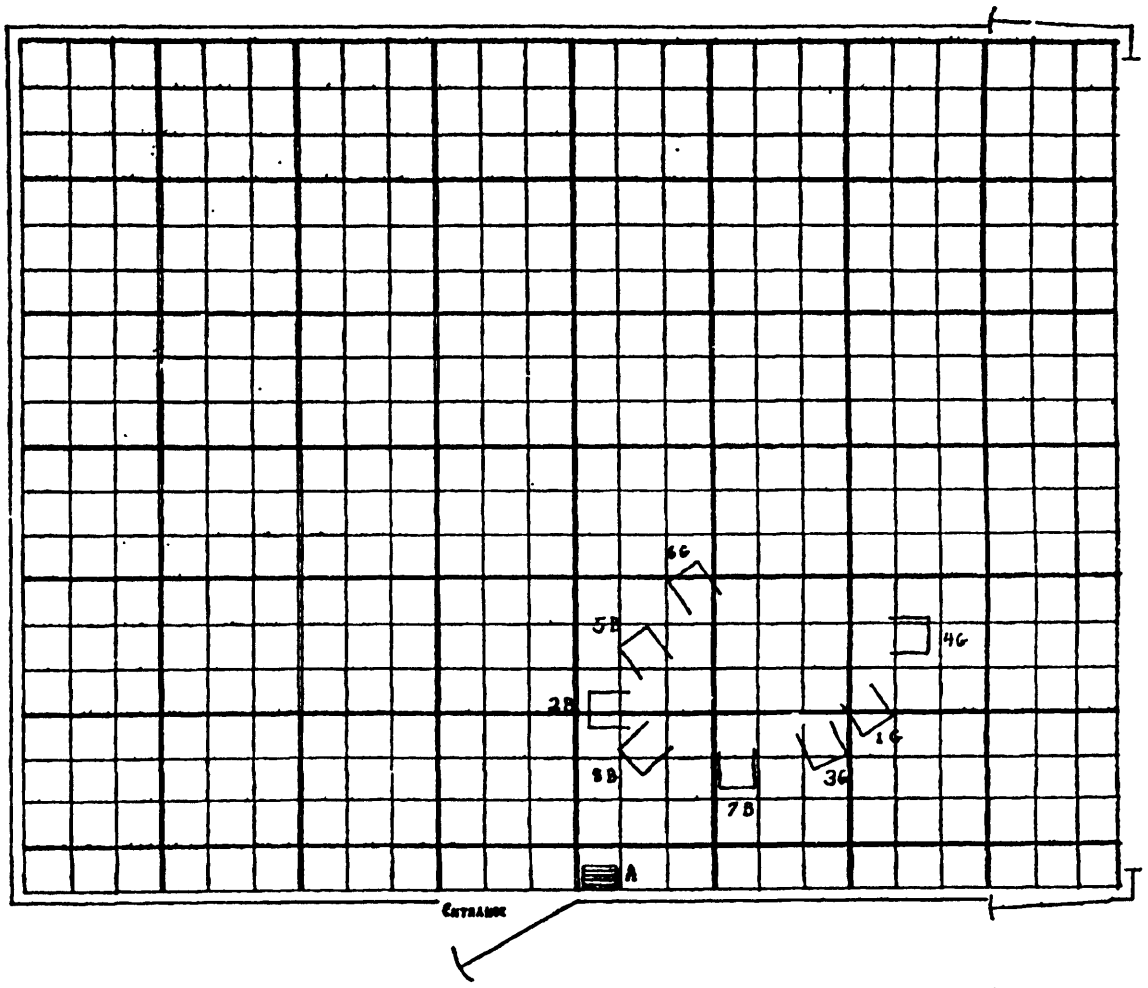
FIGURE 1



Grid diagram of the placement of chairs in an Individual Decision group (#14). Pile of chairs is at A. The number-letter pair next to each chair indicates the order of entrance into the room and the sex (Boy or Girl) of the occupant.

Fig 1. Diagram showing the results of seat positioning in decision-making exercises from Batchelor and Geothals' (1972) study. (Batchelor and Goethals, 1972, p.276)

FIGURE 2



Grid diagram of the placement of chairs in a Collective Decision group (#12). Pile of chairs is at A. The number-letter pair next to each chair indicates the order of entrance into the room and the sex (Boy or Girl) of the occupant.

Fig 2. Diagram showing the results of seat positioning in decision-making exercises from Batchelor and Geothals' (1972) study. (Batchelor and Goethals, 1972, p.276)

Importantly, the most characteristic shape of groupings in the Individual Decision stipulation was a "J-shape, which frequently followed two walls" (or "anchored" as Robson and Khimes (2004) would describe).[8] Contrastingly, the Collective Decision specification recorded "five out of ten times the formation was a C-shape" (Batchelor and Goethals, 1972, pp. 274-275).[9] The experiment also found the range of distance from the nearest person in the Collective Decision groups is 2.09inches to 3.62inches. This is very close to Hall's "far phase" of personal distance, 2.25inches to 4.00inches, described as suitable for discussions of "personal interest and involvement." (ibid, pp. 276).

Interestingly, the distinction in differentiated decision-making processes resulted in a clear spatial distinction illustrated in Fig 1.-Fig 2., yet the researchers chose to study behaviour and visibility in terms of distances, reducing a spatial pattern to an inter-person metric law. This paper recognises the intentions of the authors in the search for optimum inter-person distances as Hall has suggested; however, it finds the spatial patterning and orientation of subjects far more interesting than defining personal space in distances. In the end, 5.5inches as the upper-limit for 2-person conversation (ibid, pp. 270) only affords a limited description of social behaviour.

Mehrabian's research has been influential in environmental psychology theory; his collaboration with Diamond (1971) postulates "immediate positioning of strangers leads them to communicate liking to each other" (Mehrabian and Diamond, 1971, p. 281). Although this paper is uninterested in "liking" between participants, the study asks the extremely pertinent questions regarding seat-choice, furniture arrangement and social interaction; in addition, it asks why "people differ in the ways they arrange their furniture" (ibid, p. 281).

The terms 'Sociofugal and 'sociopetal' are introduced by Mehrabian and Diamond (ibid) to describe "spaces which drive people away from each other

[8] Batchelor and Goethals found that "five out of ten groups exhibited this pattern" (Batchelor and Goethals, 1972, pp. 274-275).
[9] Additionally, "the formation was a closed circle twice, and twice the formation was a flattened C-shape. The remaining group consisted of two overlapping C-shapes, one made up of girls and the other made up of boys. The groups in both conditions tended to locate in the half of the room which was closer to the window" (Batchelor and Goethals, 1972, pp. 274-275).

and those which bring people together to enhance social interaction, respectively" (ibid, p. 281). Highly relevant to this study, the possibility of a "general definition of sociofugal and sociopetal furniture arrangements" is discussed (ibid, p. 281).

Mehrabian and Diamond (1978) assert "directness of orientation also affects conversation" (ibid, p. 281);[10] interestingly, they mention measuring "directness" by 'how many degrees one must turn to face another" (ibid, p. 282); perhaps this echoes (at a basic level) the methodology behind the calculation of visual connectivity in space syntax Visibility Graph Analysis.

The work of Robson (1999) and Kimes and Robson (2004) is of direct concern to this paper; the authors are professors in hotel management and have written particularly about expenditure in food and beverage establishments. Understandably, their focus is operational rather than spatial, and for this reason, they do not discuss the spatial implications of restaurant-space in the way space syntax methodology can. Robson (1999) cites environment psychology's "approach-avoidance" as an explanation model of human behaviour, advocating it is "largely a result of the interplay of three distinct perceptual factors: pleasure, arousal and dominance" (Robson, 1999, p. 57).

[10] Argyle (1978) states proximity (distance) is linked to *orientation,* "closer degrees of proximity are usually combined with a shift of orientation away from head-on to side-by-side; intimacy can be maintained at the same level, since there is a progressive loss of eye-contact as the body is turned "(Argyle, 1978, p.96). Accordingly, "a 0^0 orientation (face to face) is most direct; 90^0 (positioned at right angles) is an intermediate orientation; and 180^0 (side-by-side) is even less direct" (ibid, p. 282). Mehrabian and Diamond's (ibid.) study indicated the "180^0, side-by-side orientation was clearly detrimental to conversation" and "90^0 and 0^0 arrangements had effects similar to each other, with the 90^0 orientation being only slightly less conducive to conversation than the 0^0, face to face, position" (ibid, p. 282). Compared with previous findings, Ittelson and Proshansky's (1974) findings is in opposition to Patterson, Kelly, Kondracki and Wulf (1979). Perhaps the difference in findings is dependent on the different focus of each study; while Mehrabian and Diamond (1971), and Ittelson and Proshansky (1974) have geared their experiment-field around groups as a aggregation of inter-personal relations, Patterson et al. have looked at the same relationship taking into account group dynamics.

Accordingly, the combination of these conditions thus affects our perception (and "liking" – cf. Mehrabian and Diamond, 1971) of an environment, inviting or repelling people to enter. [11] Intuitively, the "approach-avoidance" model corresponds to Mehrabian and Diamond's (1971) and Hall's (1966) "sociopetal" and "sociofugal" processes at a perceptual level. Sociologists Argyle and Dean (1965) cite similar "approach-avoidance [theories] of proximity, adding that people "attracted [or] repelled by another" assume positions "corresponding to the equilibrium" (Argyle, 1978, p.95). [12]

The approach-avoidance model can be useful to food and beverage (F&B) operators who would be interested in "an attractive level of stimulation" that over time becomes "sensory overload" (the transmission of too much information), reducing guests' desire to stay and thereby encouraging tables to turn" (Robson, 1999, p. 57). An example is the prolific use of the colour to attract customers to an interesting space that might become jarring after a while; the "warm colours make food look better", and give the impression of happy customers due to warm lighting (ibid, p. 57). Robson (ibid.) asserts restaurants that manipulate colour successfully include "Burger King, McDonald's and Wendy's"; they use "highly saturated colours" in each franchise (ibid, p. 58) to convey a clear corporate image – people know what to expect from them. However, this paper questions the suggestion that all restaurant interiors should adopt the shiny colours of low-end fast food establishments.[13]

---

[11] In experiments in which pairs of subjects were placed 2, 6, and 10 feet apart it was found that at 2 feet subjects leant backwards, while at 10 feet they leant forward – as if trying to get to their normal equilibrium point. If two people like one another, according to this theory, the approach forces would be stronger and greater proximity results. It was also postulated that proximity is one among a number of ways of establishing intimacy, and that one signal could compensate for another" (Argyle, 1978, p.95).

[12] In addition, Argyle (1978) adds the approach-avoidance theory of proximity "depends on the balance of approach and avoidance forces. It was found by Mehrabian (1968) that subjects stand closer to someone they like (6 ½ inches), and by Campbell *et al.* (1966) that they move closer to members of preferred racial groups. Porter *et al.* also found that females stood closer than males to a same-sex target (5.3 inches)" (Argyle, 1978, p.96).

[13] According to Robson (1999.), other factors that contribute to optimal ambient settings are "lighting" (as previously mentioned in conjunction with colour) and "sound". Robson (ibid) highlights further that "creating pools of light to highlight aspects of an environment", for example, "tabletops", suggest a" defined 'territory' at each table – a successful approach if extending patron stays is the desired effect" (ibid, pp. 59-60). Here, Robson introduces the term "territoriality" to the discussion that is later emphasized as a defining principle in environmental psychology; it is also the overriding theory that has attracted criticism for this field of study. Also, Robson (ibid.) cites Mehrabian and Russell in noting that "bright lights contribute to arousal that

Robson (1999) produces the first reference in this paper to the widely-recognised notion that humans "are social creatures"; un-peopled public space enhances feelings of vulnerability, leading to the active pursuit of "the company of others" (ibid, p. 60). Therefore, people are "drawn to settings where others congregate and where we will be accepted as part of the dominant group" (ibid, p. 60). This paper disagrees that "dominance" applies directly to inter-personal relations; as described later in the nature of the hotel bar as a *liminal zone*, much of group-dynamics and inter-group dynamics in this setting is based on equality rather than competition. In contrast this paper suggests that "control" is a legitimate part of perception processes that indicate the nature of small-group behaviour.[14]

In the tradition of environmental psychology, Robson (1999) asserts "overcrowded environments ... reduces our ability to create and defend a personal territory" (ibid, p. 60). She introduces the notion of "anchoring" ourselves with "a physical element of the environment (against wall or column, in a booth, or even beside a potted plant), limiting the information and stimulation reaching us and making it easier to defend our space" (ibid, p. 60). However, this paper goes on to suggest that this may apply to individuals or smaller 2-person groups rather than larger groups which base their positioning on more convincing theories discussed in later sections.

Robson (1999) draws a balance between the desire for social interaction against securing territory (ibid, p. 60), stating "to encourage table turns" a restaurant should feature "a high number of unanchored seats in the large open dining space", suggesting that diners at these tables are "likely to feel more exposed and less in control – and therefore would be expected to leave sooner-than those who are anchored" (ibid, p. 60). Intuitively, this paper recognises the operational advantage of this approach, and acknowledges that successful

---

people are naturally drawn to light sources" (ibid, p. 58); the video observations undertaken in this study described in later sections, supports this notion, but it is peripheral to the study.

[14] Robson (1999) references environmental psychology in suggesting, "*dominance* is the degree of control and freedom to act that we perceive we have in a setting" (ibid, p. 57). The "ability to rearrange furniture" aids in creating a defence of "personal space, an important contribute to our feeling of well-being and comfort" (ibid, p. 57). The theme of "control" is discussed throughout this paper which goes on to argue that the term need not mean "dominance" over others.

commercial design often employs this method instinctively, but will demonstrate that there are circumstances where increased stay results in increased spending behaviour.

In a later study, Kimes and Robson (2004) examine "table type [and] location – to determine whether the placement or configuration of a dining table (in particular, whether it has an architectural "anchor"[15]) has measurable effects on duration and average [bill amounts], which were combined to show average *spending per minute* (SPM)" (ibid, p. 333). Interestingly, table configurations are assessed (operationally) in terms of revenue generated, rather than spatially.

Kimes and Robson's (2004) analysis revealed

> SPM for parties at booths was slightly higher than average, while the SPM for diners at banquette tables was below average. Ironically, tables in poor locations in the dining room generated SPM values higher than supposedly "good" tables. These findings suggest that restaurant designers re-examine the use of banquettes[16] and not be overly concerned about "bad" tables.[17] (ibid, p. 333).

---

[15] Kimes and Robson (1999, 2004) emphasize the notion of "anchored" furniture. This translates into people's preference for positions that are perceived to be attached to a part of fixed architecture. Kimes and Robson (2004) assert, "anchored tables might result in more time spent in the setting and higher spending"; also, they suggest "a face-to-face configuration may lead to a longer stay and a larger average [bill]" than a side-by-side seating arrangement (ibid, p. 336). This paper comments on these findings later in the paper with reference to the effects of varying furniture types in increasing customer spending and increasing business revenue.

[16] Interestingly, Kimes and Robson (2004) "expected that the lack of privacy at banquette seating would lead to shorter durations, but in fact, duration at banquettes was the longest of all table types and, combined with lower spending, resulted in the lowest SPM observed" (ibid, p. 344). Therefore, this diminishing the potential for increased revenue. They suggest that the perceived advantages of banquette-seating may not be as efficient as designers previously thought as their study shows banquettes encourage low-spending guests to linger (ibid, p. 344). Additionally, banquettes are usually in L-shaped or linear arrangements (described earlier as hindering social communication within the group; Patterson, Kelly, Kondracki and Wulf, 1979, p. 183).

[17] "Bad" tables are distinguished as being situated in uncomfortable positions, such as tables closest to the kitchen (with its strong smells and loud noises), along circulation routes where staff move frequently with large plates of food or in awkward spaces that do not afford comfortable views of the rest of the dining floor. The shorter duration at bad tables – 41.7 minutes as opposed to the mean duration of 47.4 minutes for all tables – might be explained by the discomfort and lack of privacy associated with an exposed location next to the kitchen or other service areas, but spending at these poorly placed tables was no different than for other locations in the restaurant (Kimes and Robson, 2004, p. 34).

Kimes and Robson (ibid.), found that "seats at right angles to one another appear to encourage interaction, ... as opposed to seats directly facing a companion" (ibid, p. 335), adding to the debate of previous studies.

Customers did not show a preference for tables that afforded more privacy, and " anchored tables did not have a significantly different dining duration than those seated at unanchored tables"; however, customers in larger parties were shown to stay longer, while table size was not significantly related to meal duration (ibid, p. 342).[18]

Also, table configuration did not correspond significantly with length-of-stay - "diagonal [seated orientation] = 47.4 minutes, side-by-side = 47.4 minutes" (ibid, p. 342). Finally, it was found that customers seated at "bad" tables logically "stayed a significantly shorter time that those seated at "good" tables – bad [table]' = 41.7 minutes, 'good [table]' = 47.4 minutes" (ibid, p. 342). [19]

In addition, Kimes and Robson (2004) equate a preference for "anchored" tables (such as booths and banquettes) to a desire for *privacy*, suggesting "seats that offer greater privacy are preferred by customers" (ibid, p. 342); this paper suggests that there is a basis for recognising the preference for anchored seats.[20] However, this preference is more accurately related to notions of *visual control* and *controllability* (demonstrated later on), rather than explained by environmental psychology *privacy,* which Kimes and Robson (2004) advocate.

---

[18] "Meal duration" is used as an indication of the level of comfort customers feel at a table position (Robson and Kimes, 2004, p. 342). Sommer and Steele also looked at the interaction of group size and duration of use in coffee shops and traditional restaurants, noting that in both settings groups of diners occupied their tables for longer that patrons dining alone (ibid, p. 335). Perhaps this indicates the nature of spending and sociability, where larger groups more ready to spend money.

[19] Kimes and Robson qualify that data was collected "during peak demand periods, which may have affected patrons' behaviour" and a further observations at varying time periods is necessary (Kimes and Robson, 2004, p. 342); Argyle reinterates "perhaps the most pressing need at the present time is for detailed studies of small groups in the field" (Argyle, 1978, p. 216-217).

[20] Similarly, Argyle (1978) agrees that experiment "subjects stand closer to inanimate objects" (Argyle, 1978, p.96).

Already, this study has hinted at an emphasis on spatial properties that affects the behaviour-environment relationship, suggesting an alternative (structural and ecological) approach that adds to the existing body of research. The methodology employed and phenomena described in the preceding studies relate to the current investigation of positioning and orientation in the understanding of the environment at the scale of the individual and small-group behaviour. However, this paper questions the validity of employing these findings as a comparative base[21]; although they make valid descriptions of patterns of behaviour, they seem to be firmly entrenched in the man-environment paradigm. To this end, this paper finds it problematic to discuss these studies divorced from its theoretical basis and discusses its problematic paradigmatic assumptions in the following section.

[21] For example, Robson and Kimes (1999, 2004) look for direct causal relations between operational results and the environment using the theories of environment psychology as explanations, rather than spatial factors for people's perception of the space. Although this paper recognizes the importance of spending as a product of good spatial design; by using spending as a primary data-set, perhaps Kimes and Robson (2004) ignore the important intermediate relations that allow seating to affect spending.

1.2.2. Critique of the Man-environment paradigm and Environmental Psychology

Space syntax theory (Hillier and Leaman, 1973; Hillier and Hanson, 1984, Hiller, 1996, et al.) introduces a *structural* alternative to the theories of environmental psychology in the organization of the built environment. Griffiths and Quick (2005) reiterate this rejection of the man-environment paradigm, explaining it to be paradoxical and disjointed.

In reviewing select literature on the field of Environmental Psychology (EP), "Territoriality" (EP's fundamental and most widely-known theory) as a universal principle, seemingly fails to address the relationship between space and sociality in a convincing way. While *semiology* abstracts the physical space into descriptive signals and signs (Hillier and Hanson, 1984, pp. 8-9), EP views the (spatial) environment as a product of human behaviour that results from historical-cultural, and even biological, conditioning[22]. It follows the logic that the built environment is man-made, and therefore, a product of human cognition, which in turn produces set patterned behaviour (as our biology and cognitive needs are similar at a basic level); therefore, it returns to the underlying fact that all man-made environments are built to suite human activities that produce our behavioural habits.

Essentially, EP states that the differences in observed behaviour and reaction to the physical environment, and the spatial variations in the environments themselves, is due to social norms that result from distinct cultural habituation emerging over time (Proshansky, Ittelson and Rivlin, 1960; Ittelson and Proshansky, 1874).[23] Ittelson and Proshansky (1874) assert "Man is a *cognitive*

---

[22] Ittelson and Proshansky (1974) suggest "man's socio-spatial behaviour is guided by two forces, both stemming from his cultural context. The first is the cultural rules that governs his positioning in *space*, the distances maintained from others, the orientation of his body, his posture, and his nonverbal communications. The second is the cultural symbols signalling the way a particular *place* might be used, the arrangement that suggests intimacy or formality, talking or eating, conversation or prayer" (Ittelson and Proshansky, 1974, p. 130).

[23] Argyle (1978) comments on the nature of small-group behaviour as observed in laboratory-based experiments, suggesting "the most important and widely confirmed generalisation about social groups is that they form norms (Argyle, 1978, p. 224). According to Argyle (1968), "norms begin as a kind of working agreement among the original members of the group. New members

animal" who "engages in... human forms of *knowing*"[24] that transcends the mere recording of stimuli by our senses suggested in behaviourism (ibid, p. 85). As mentioned previously, this paper interprets EP's main principle to be culturally driven (based on the 'nurture' argument); it agrees to an extent with EP that there is a relationship between "man [and] his physical environment", but does not have the same conviction that this relationship is simply based on mutual causal "influences" that is the "root... of how he perceives... '*his* environment'" (ibid, p. 103)[25].

EP claims there is "no factual basis" (ibid, p. 104) to the notion of a space-environment, but exists purely to make the problem-field discursive; this paper interprets the EP stance as: spaces exist as "the total environment [background which holds] man [as] one kind of component in relation to other kinds of components (ibid, p. 104). In addition, EP suggests "the environment... is the product, not the cause of perception" (ibid, p. 105). In other words, "the environment itself is 'normative' only to the extent that it signifies something to the social agent; it is he who introduces the norms,... he may alter the environment to make the normative behaviour more easily followed" (ibid, p. 129). From a space syntax standpoint, this approach that rejects the spatiality of

---

may share the norm behaviour from the outset (and may have joined for this reason); if they do not share it, group processes are set into operation which often result in their conforming interaction" (Argyle, 1978, p. 225). However, Argyle admits this *sociometric* method fails to explain "the immense differences between different types of 'choice' – between husband and wife, committee member and chairman, adolescent friends, etc... like all measures and indices, it abstracts certain things and overlooks the rest: whether or not A chooses B as a companion for some activity does not tell us much about the relationship – even though this is one of the most important dimensions of interpersonal attitudes" (Argyle, 1978, p. 238). Lastly, the sociologist approach of *sociometry* "treats a group as the sum of a number of dyadic relationships; however, this is only part of the story – A's relation to B may be quite changed if C is going to be there too" (ibid, p. 238). This comment is also addressed in the discussion on the molar and molecular approach of Barker's Ecological Psychology that rejects the fractal study of the behaviour-environment relationship.

[24] Ittelson and Proshanksy (1974) claim that their "concept of predictability leads [them] to treat environment perception as the creation of certainty out of uncertainty or probability ... the experienced consequences of actions [or the observed consequences of actions] provide a check on the perceptual predictions on which the actions are based (ibid, p. 123) – learnt knowledge, therefore, leads to a predictable environment that inhabitants have a perceived control over; a possible passing reference to Piaget's *interactionist* approach.

[25] The Environmental Psychology position highlights the duality of the objective environment as "collections of objects and surfaces" vs. subjective environment as perceived – "his environment". Earlier in the paper, Hillier and Leaman (1973) comment on this distinction as being the fundamental flaw in the man-environment paradigm.

environments (accordingly, its part in the concept of *logical space and structural coupling*), is intuitively flawed.

Hillier and Leaman (1973) assert that environmental psychology is inherently flawed as it originates in the man-environment paradigm. It is suggested that the culmination of "the organism-environment concept in biology, the subject-object interdependence in Kant; and the resultant concept of man as the object of a science constitutes the man-environment paradigm of science and meta-science pervasive in nineteenth [and twentieth] century thinking" (ibid, p. 508).

They state, "this crystallises in the notion of the organism as machine-system operating in an environment with which it is dynamically related by 'causal' connections'" (ibid, p. 508).[26] According to Hillier and Leaman, the man-environment paradigm "embodies profound anomalies" (ibid, p. 508). A review of these theories is made equally problematic by, as they describe, the fact that opposing theories are "irreconcilable", though "not in conflict" (ibid, p. 508), making it difficult to distinguish the subtle differences in approach that profoundly differentiate each standpoint. Therefore, an unnecessary "piecemeal ... conceptual apparatus" (ibid, p. 509) has evolved that transforms the "problem" of the man-environment relation (in itself, a valid theoretical investigation) into an irreconcilable theoretical approach.

Hillier and Leaman argue convincingly that "although the man-environment paradigm initially promises a reconciliation of rationalism and empiricism (that is, the basic problem of how far knowledge and behaviour originate within us or outside us), it only succeeds in reproducing it in exacerbated form" (ibid, p. 508).[27] Ittelson and Proshansky themselves state that their theories are descriptive, and "do not explain behaviour" (ibid, p. 160).

---

[26] As mentioned previously, existing studies related to the discussion in this paper dismiss seating orientation as having no direct "causal" effect on sociability (Ittelson and Proshansky, 1974; Robson, 1999; Kimes and Robson, 2004). This causal relationship is also conceptualised by von Bertalanffy as 'open system theory', raising the 'man-environment paradigm' to the level of an overriding explanatory principle" (Hillier and Leaman, 1973, p. 508). The term 'open system theory' in the social sciences simply refers to the exchange of information between subjects and their environment (Proshansky, Ittelson et al.)

[27] This issue is discussed further in this paper with reference to Barker's ecological psychology concern with the discrepancy between discrete systems working concurrently (that Griffiths and

The glaring paradox within the man-environment paradigm is summarised in the critique that it consists of "two mutually exclusive epistemological positions – that of the organism looking out into the environment, and that of the environment bearing in on the individual" (ibid, p. 508). Within the same paradigm, "each offers a radical critique of the other's inadequacy, each exists as an anomaly within the explanatory systems of the other. Individual, or creative behaviour, appears as an anomaly in environmental mechanism" (ibid, p. 508). From one position, "individual, or creative behaviour appears as an anomaly in environmental mechanism" and from the other, "subjectivist views cannot begin to explain the coercive nature of, for example, social structures" (ibid, p. 508).

According to Hillier and Leaman (ibid.), "the paradigm cannot account for individual or social knowledge, or for the nature of societies, or even urban systems, except by reproducing the mechanism and metaphysics of its predecessors". The flawed underlying assumption is that the life-world is categorically divisible into "subjects and objects, organisms and the environments" (ibid, p. 508). [28]

Existing practical laboratory studies reviewed in this paper (Sommer, 1959, 1962; Hall, 1966; Mehrabian and Diamond, 1971; Batchelor and Goethals, 1972; Patterson, Kelly, Kondracki and Wulf, 1979) concentrate on the behaviour of individuals in relation to immediate spatial environment factors; these studies are successful in interpreting the man-environment relationship at this level.

Quick, 2005, refer to as *structural coupling*) that produce and affect the behaviour-environment relationship.

[28] Hillier and Leaman comments on Piaget *constructivism* as a seemingly adequately explanation of individual behaviour; however, it still does not account for "how societies construct the category of knowledge"(Hillier and Leaman, 1973, p. 509). Piaget's "constructivist" alternative advocates that the "knowledge of an object does not consist of having a static mental copy of the object but of effecting transformations and effecting some understanding of the mechanisms of these transformations" This emphasis of knowledge as the overriding mechanism grows through "exchanges and interactions" - the primary relation being of learning, "assimilation and accommodation" (ibid, p. 509).
According to Hillier and Leaman, Piaget emphasises a person's own "constructive activity", in relation to external objects or "internalised symbols and representations" constructing for himself "a model of cognitive development" that is dynamic and changing constantly (Hillier and Leaman, 1973, p. 509).

However, this paper (with reference to Hillier, Hanson and Leaman)[29] asserts that these investigations are similarly based on spatial assumptions that ignore anomalies in the man-environment paradigm at a higher level and therefore, become less convincing.

Space syntax has been greatly influenced by the movement "structuralism"; the latter advocates "a non-spatial alternative" that according to Hillier and Leaman (1873), replaces the "the naïve spatiality" of the man-environment paradigm with a "*logical space*" paradigm[30] (Hillier and Leman, 1973, p.510). It is on this simple principle that the current discussion is based. Therefore, space syntax approaches "the individual through the structures of logical space which mediate his existence" (better able to address real-world phenomena) than "either man-environment mechanism or its subjectivist alternative" (Hillier and Leaman, 1973, p. 511). Space syntax methodology, backed by the *structuralist* approach to behaviour, aims to analyse everyday phenomena in scientific terms that is not possible in "environmental studies, dominated as it is by the techniques and paradigmatic assumptions of the 'related' disciplines" (ibid, p. 511).

In addition, Griffths and Quick's study (2005) attempts explain the embodied situation in *life-space*, as a "structural coupling" of obscure processes occurring seamlessly and simultaneously. Theoretically, this paper suggests that there

---

[29] In one instance, Hillier and Leaman (1973) state that studies in the tradition of behaviourism sees "the environment of the organism [as] its immediate spatial environment" based on anomalous assumptions and their "mechanistic implications" remain indeterminate within the paradigm. One example states that "society cannot be more than the sum of individuals which comprise it, since these are the only 'units of analysis' that can be seen" (ibid, p. 509). At the same time, Hillier and Leaman explain that intuitively, society still exists even though it is intangible and that "environment is somehow important even though it does not determine society in any mechanistic [directly causal] way" (ibid, p. 510). Hillier and Leaman cites the example of "urban space [as being] intelligible because it is a part of [an underlying] structure that does not exist in spatial unified form; It, like language, can be thought of as existing in logical space" (ibid, p. 510).

[30] According to Hillier and Leaman, structuralism suggests that we exist not merely in "spatial space" but as it is assembled in our logical comprehension, "an imaginary many-dimensional space created by and filled with ... signs, symbols and representations. It exists neither purely in our heads nor in real space outside but constitutes the medium through which the relation between the two is made. [it] creates spatial or architectural space as one of a number of perceptual 'realities' it interprets, [representing] the results of our cognitive operations on the world... It is to be reconstructed scientifically through structural mathematics – principally algebra and logic – rather than [quantitatively through] arithmetic, calculus, statistics – of the man-environment paradigm" (Hillier and Leaman, 1973, p. 510).

are three systems working concurrently at the level of social interaction between human subjects and space, furniture and other people. Firstly, there is an organising structural logic of space, running in parallel to the (spatial) interaction between people within their previously defined small social groups, and lastly, the system that produces perception and cognition – the way our minds organise our surroundings.[31]

Additional commentary of EP's theories may inform the current discussion: according to Ittelson and Proshansky's (1974) "man certainly gives evidence of territorial behaviour" (ibid, p. 142).[32] In terms of person-to-person interaction spatiality, extensive research has wielded results mainly on the subject of *personal space* (ibid, p. 131).[33] EP suggests that "embodied in the places we take, positions we hold, postures we maintain is the expectation that others will behave in a reciprocal manner... [and] is at the heart of the interaction process, learned within specific groups and specific contexts" - norms (ibid, p. 131). This paper agrees that with this on a basic level but disagrees that "these reactions [which] have some biological roots... [and] "proxemic"[34] behaviour is culturally determined" (ibid, p. 132). In response to the argument: "societies exhibit different social norms, and in addition, such factors as age, sex, role, status, cultural background, race, and environmental conditions such as noise (Canon and Mathews, 1973) operate as variables within a given milieu" (Ittelson and Proshansky,1974, p. 132), this paper suggests that personal and social distances can be more accurately attributed to the perception and visibility attributed to *logical space*.

---

[31] Hillier and Leaman (1973) and Barker (1968) hint at this process.

[32] EP claims "one way man achieves a sense of control over his life is through his ability to control significant behaviours in defined areas of space... it assumes implicitly that man [like animals lay] claim to his territory (Ittelson and Proshansky, 1974, p. 142). Ittelson and Proshansky (1974) cite Roos (1968) in highlighting that "territorial behaviour in animals is instinctive: in men it is optional. Much of what is called human territoriality involves the concept of private property. To assume that such behaviour serves the same functions in man as in lower organisms, or that it is rooted in innately determined biological mechanisms, simply ignores the properties that distinguish people from other organisms" (Ittelson and Proshansky, 1974, p. 142); EP emphasizes the "freedom of choice" as an important factor in behaviour phenomena (which is again based on cultural influences) fundamental to their theory.

[33] In EP terms, Hall (1966) defines distances as being cultural: "personal space (the protective sphere), the *social distance* of most interpersonal and small group discourse, and the more far flung *public distances"* (Ittelson and Proshansky,1974, p. 131).

[34] Proxemic behaviour is mentioned earlier with reference to the discussion of the approach-avoidance model and Hall's (1966) sociofugal and sociopetal forces.

EP views *crowding* as a negative effect based on the historical assumption that over-crowding in cities, is dangerous. According to Ittelson and Proshansky (1974), "the term 'crowding' is usually employed when the number of persons in a given unit of space exceeds an optimum standard for comfort and normal functioning" (ibid, p. 148). [35] In terms of observing behaviour in "crowded' conditions, EP doesn't provide a conclusive standpoint, claiming that people "can feel crowded even though few people are present" and at other times, "enjoy masses of people about" (ibid, p. 148). EP makes the further claim that "the optimum number of individuals in a physical setting can be maintained or achieved by increasing or redesigning space, the unpleasant effects of crowding can be reduced" (ibid, p. 149). [36] Therefore, crowding is viewed as "a psychological as well as an objectively viewed social phenomenon" (ibid, p. 149), not a spatial one. This rejection of the spatial properties of the environment implies a dismissal of the logic that we live in a spatial world; therefore, crowding (as with other social theories) would benefit from a spatial standpoint as sociability (and arguably, society) has to manifest within (even overcome) spatial properties to exist.

EP then adds that in other instances, "people prefer a packed to a sparsely populated... events because the presence of others adds to the excitement. The... crowd is part of the fun" (Ittelson and Proshansky, 1974, p. 151). Again, Environmental Psychologists admit that there are situations in which people "unexpectedly select the crowded over an equally convenient less crowded area" (ibid, p. 150), offering no theoretical explanation for the phenomena.[37]

---

[35] In sociology, *crowding* also "refers to the number of persons per living unit; in western countries, the threshold is usually considered 1.01 or more persons per room" (Ittelson and Proshansky, 1974, p. 148). It is also "sometimes distinguished from density and congestion"; *density* measures "the number of persons per acre of land, or per census tract", whereas *congestion* refers to "the number or magnitude of activities in excess of the capacity of an area or facility" (Ittelson and Proshansky, 1974, p. 148).

[36] According to EP, individual perception of crowding, depends on past experience, affecting his willingness "to accept in the present. Cultural and subcultural differences in the use and organization of space may also explain acceptable levels of crowd density (Schmitt 1963; Hall 1966; Lucas 1964)" (Ittelson and Proshansky, 1974, p. 150).

[37] EP's statement is a reminder of Kimes and Robson's (2004) comment on their observations that people prefer to dine in acceptably crowded places in the presences of others rather than in empty restaurants, perceiving empty spaces as a reflection of the poor performance of the business, resulting in an undesired atmosphere.

Canetti's *crowd theory* (1960) asserts "man from his earliest beginnings, *wanted* to be a crowd; only the smallness of his numbers when he lived in packs has obscured the simple truth that man always wanted 'to be more' (CP, p. 107)" (McClelland, 1989, p. 303); this serves to highlight that studies concentrating on groups as merely the aggregation of individuals are inherently problematic.[38] As Canetti (1960) explains, a consolidated group of people is more than the sum of its parts (Canetti, 1960, et al.; McClelland, 1989, pp. 307-319). Therefore, directly contrasting environmental psychology's "crowding", crowd theory (Canetti,1960) and Space Syntax philosophy (Hillier and Hanson, 1984, et al.) assert that humans have a natural urge to be in each others' presence and to socialize in *packs*.

Canetti (1960) is especially interested in transformation which involves *self-increase* that "gives birth to crowds".(Canetti, 1960, p. 107; McClelland, 1989, p. 319).[39] According to McClelland, Canetti (1960) viewed the crowd as a single entity with its own characteristics that manifest out of the solidarity of an aggregation of persons; numbers of persons become a crowd after crossing a "threshold" or "transformation" (McClelland, 1989, p. 319).[40] Therefore, this paper hypothesises that there is a spatiality to Canetti's crowd theory that is provable through the techniques in this paper that relate phenomena of crowding or small-group behaviour to social situations. According to Ittelson and Proshansky (1974), "privacy and crowding are often linked" (ibid, p. 152).[41]

---

[38] These studies dismiss the gathering of people as a collection of subjects that are useful as a large enough statistical pool from which a theory of behaviour can be formulated

[39] McClelland (1989), citing Canetti (1960), asserts "like all crowds, the 'open crowd' *becomes* a crowd at the moment of *discharge*, when the differences (of rank, status and property) between men disappear; the equality which comes about when men shed these burdens of distance, which include the accumulated 'stings of command', is an illusion, because eventually everyone returns to their normal workday selves', but while the crowd is on the streets its equality is real. ... The open crowd puts all its hopes on increase, and just as it originates, so it disappears (CP, p. 16). (McClelland, 1989, p. 307). Therefore, such is the case in the hotel bar as a "liminal third space" where inhabitants are transitory and the occupation of space by individuals or groups is in constant flux.

[40] Argyle describes the group dynamic slightly differently but states can hardly be regarded as a group, as opposed to a collection of individuals, unless there is some minimal degree of attraction towards the group (Argyle, 1978, p. 217).

[41] Ittelson and Proshansky (1974) cite Westin (1967), defining *privacy* as "the claim of individuals, groups or institutions to determine for themselves when, how and to what extent information about themselves is communicated to others... iin terms of the relation of the individual to social participation, privacy is the voluntary and temporary withdrawal of a person

Although *privacy* is the least explained theory in the EP trilogy, this study finds it as an interesting theory when coupled with *crowding* at the level of social phenomena, as observed at the Lazy Dog bar. This study asks: How can a theory of privacy and its superficial antithesis to crowding/sociality inform on the phenomena of the hotel bar?

1.2.3. Ecological Psychology

Barker's Ecological Psychology "is concerned with both molecular and molar behaviour, and with both the psychological environment (the *life-space* in Kurt Lewin's terms: the world as a particular person perceives and is otherwise affected it) and with the ecological environment (the objective, pre-perceptual context of behaviour; the real-life settings within which people behave" (Barker, 1968, p.1), particularly, the "*methods and concepts for dealing with the ecological environment of molar human behaviour*" (Barker, 1968, p. 1).

Barker's critique of the "science of psychology" is that it "has had no adequate knowledge of the psychologist-free environment of behaviour" (ibid, p.4). In his opinion, research "indicates that when we look at the environment of behaviour as a phenomenon worthy of investigation for itself, and not as an instrument for unravelling the behaviour-relevant programming within persons, ... From this viewpoint, the environment is seen to consist of highly structured, improbable arrangement of objects and events which coerce behaviour in accordance with their own dynamic patterning" (ibid, p.4). This paper agrees with this aspect of Barker's approach, and finds it similar to the space syntax view of describing spatial properties in terms outside of itself.[42]

---

from the general society through physical or psychological means, either in a state of solitude or small-group intimacy or, when among large groups, in a condition of anonymity or reserve. (p.7)" (Ittelson and Proshansky, 1974, p. 154). Westin states their related functions are *solitude, intimacy, anonymity* and *reserve* (Ittelson and Proshansky, 1974, pp. 154-156). This paper highlights "anonymity" as reminiscent of Hillier's assertion that people find comfort and a sense of control in situations of anonymity, such at that experienced in public street-spaces. This also relates to Canetti's crowd theory, which advocates that people become a crowd when they relinquish their personal spatial boundaries.

[42] Although in this case, the environment is still considered a socio-psychologist phenomenon, as Barker does not speak of the man-environment relationship in spatial terms. The point he highlights is that there is a need to describe human behaviour in terms of the environment external to its own dynamic; space syntax theory further suggests that there is a need to

According to Barker (1968),

> "the psychological person ... stands as an identifiable entity between unstable interior parts and exterior contexts, with both of which he is linked, yet from both of which he of profoundly separated. The separation comes from the fact that the inside parts and the outside contexts of a person involve phenomena that function according to laws that are different from those that govern his behaviour " (ibid, p. 6).

Barker cites Allport (1955), introducing the "inside-outside problem", of which the outside context comprises the *molar ecological environment*, consisting of naturally occurring phenomena "(1) outside a person's skill, (2) with which his molar actions are coupled, but (3) which function according to his molar behaviour (Barker, 1960, p.6); therefore, Baker disassociates ecological environment from "the psychological environment (or life space) and from the stimulus" (ibid, p. 6). Barker's critique of his psychology contemporaries was simply: "How can psychology hope to cope with non-psychological inputs? (ibid, p. 7).[43]

Barker further explains further, "when one uses a person's behaviour as the only evidence of what constitutes his environment, one deals with psychological variables, i.e.,with life-space phenomena" (ibid, p. 7). "The naturally occurring life-space deserves investigation, but... cannot be discovered by using the person's behaviour as sole reference point,... because the ecological environment comprises a different class of phenomenon and can only be

---

describe the environment in spatial terms that is also independent of its terms, so as to free itself from the mechanistic cycle of reproducing the same thing in a different guise – this approch is a reminder of Hillier and Leaman's (1973) criticism of the man-environment paradigm.

[43] As mentioned before, this paper suggests that Barker alludes to the presence of discrete systems functioning simultaneously in the perception-behaviour-body-environment relationship that Griffiths and Quick call *structural coupling*. According to Barker (1968), our physiological makeup of organs, hormones and muscles are not "psychological phenomena; ... in fact they are irreconcilable to the basis of psychology" (ibid, p. 6). Conveniently, Barker describes the environment "with which a person is coupled" as existing separately (ibid, p. 6).

identified and understood independently of the behaviour with which it is linked" (ibid, p. 7).

While environmental psychology claims that the built environment is more important at a discursive level as products of culture and human design choice (Ittelson and Proshansky, 1974, et al.), ecological psychology emphasises "the outside context", asserting the "context cannot be described in terms of the points of contact" within it[44]; logically, The properties of the points depend upon the structure of which they are parts" [45] (Barker, 1968, p. 8); this paper strongly agrees with this point.

The relevance of ecological psychology to this study is that it emphasises the environment as a system coupled with the human inhabitant that is inextricably linked; but laws that govern psychology and the built environment are too dislocated to be described using the same theoretical language, therefore, the relationship between space and behaviour can only be descriptive in theories that make behaviour the basis of psychology, rather than explanatory at a wholistic or *molar* (Barker, 1968, et al.) level.

Space Syntax has reconciled in a more straightforward way what Barker (1968) aimed to prove – a generic *social logic* (Hillier and Hanson, 1984, et al.) of the environment[46]; while Barker states that environment-behaviour relation on any level, must be investigated as distinct entities, space syntax introduced an approach to environmental space that produces an explanation for phenomena, drawing relationships between people (at the level of the individual or as society in its abstract whole) and their perceived spatial surroundings that does not rely on individual variance or specific experience. It explains differences either

[44] Barker (1968) also uses the analogy of the meaning of language, "words have a range of meanings, the precise one being determined by the context in which it occurs" (Barker, 1968, p. 6).

[45] Barker states that "the most primitive and simple thing we know about the ecological environment is that it has structure; it has parts with stable relations between them... It is clear that structure cannot be discovered by observing a single part, such as the point of intersection of the environment with a particular person, or by considering the parts separately" (Barker, 1968, p. 9).

[46] However, Hillier and his associates go one step further in suggesting this social logic is a spatial one

through principles that hold across different scales, or explains variations through overriding theory.

As Barker implies, the spatial environment is more constant than human behaviour, and therefore, more reliable as a bounded[47] testing field for the recording of human behaviour into empirical and statistical form[48] (Barker, 1968, p.10) that can be used to formulate patterns and the structure of a *behavioural setting*,[49] focusing on the context of the environment as a whole, rather than focusing on the environment-person intersection (behaviourism).

However, it is still firmly based on the man-environment paradigm where *contexts* are differentiated and methodology manipulates phenomena unnecessarily to fit into am empirical model;[50] in the end, a generic law of space-people relation is not explained and serves to highlight that this study should focus on ecological "molar" experience of the environment–space, rather than individual or inter-group exchanges that has been described in the previous section, and supports the employment of space syntax methodology of analysing the (spatial) environment in terms outside of its own dynamic to reinforce its theories.

---

[47] According to Barker, the identification of the ecological environment is aided by the fact that unlike the life-space, it has an objective reality "out there"; it has temporal and physical [realities]" that can be categorized into "natural... bounded units" (Barker, 1968, p. 10). Ittelson and Proshansky (1974) explained Barker's approach as having a reality of its own. This is the objective rather than the psychological environment (ibid, p. 70).

[48] Barker (1968) argues that basing empirical studies on behavioural variable is less reliable than on the built contextual environmental unit, which is perceived by individuals with different "psychological attributes; their behaviour in the same environment will, therefore, differ" (Barker, 1968, p. 10). However, he postulates that people in the same behavioural unit can be predicted to have "overall extra-individual [patterns] of behaviour"; and it follows that "inhabitants of different ecological units will exhibit different overall extra-individual patterns of behaviour" (Barker, 1968, pp. 10-11).

[49] Barker's (1968) *behaviour setting* is "bounded in space and time and has structure which interrelates physical, social, and cultural properties so that it elicits common or regularized forms of behaviour" (Ittelson and Proshansky, 1974, p. 70).

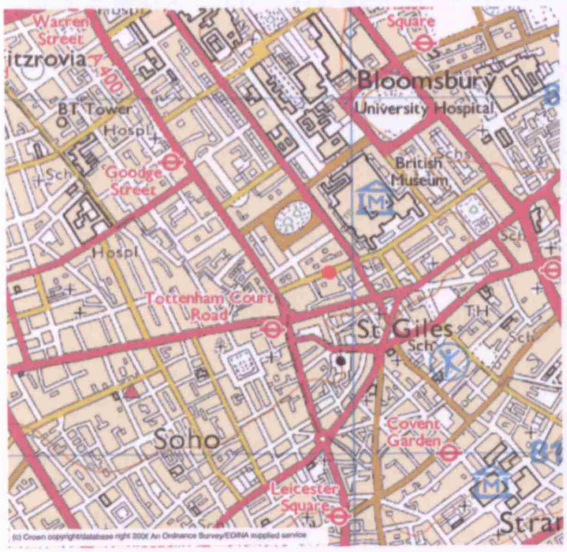
[50] It is problematic to distinguish ecological psychology as a derivative of environmental psychology as the latter seems to be a vague, all-encompassing approach to psychology, sociology, behaviour and spatial design (Ittelson amd Proshanksy, 1974, et.al).

1.3. The Lazy Dog bar

1.3.1. Description

According to EP, the hotel bar as a *play-setting*, caters to play as "an arousal-seeking behaviour" (Ittelson and Proshansky, 1974, p. 179). Ittelson and Proshanksy (1974) also cite Lowenfield (1967) in mentioning the philosopher Herbert Spencer, who saw play simply as an expenditure of surplus energy[51] (Ittelson and Proshansky, 1974, p. 179). With reference to sociologists Fox (2004) and Oldenburg (1999), it has been proven necessary for people to gather with the purpose of socialising in each other's company, rather than to expend "surplus energy"; this translates into Hillier's theories of co-presence (Hillier, 1974, et al.).

EP would probably attempt to explain the milieu of a socio-space in terms of the norms it exhibits and adheres to. However, in a place like the hotel bar, what are the "house rules" of a place that is culturally so generic in its character, as it has to accommodate people of all possible national and cultural backgrounds?



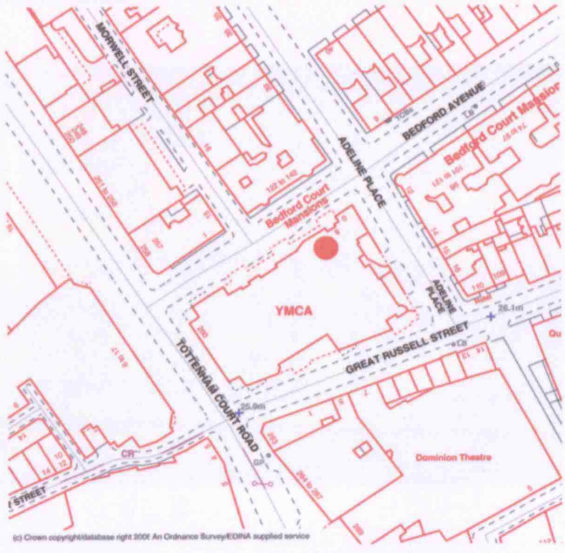


Fig 3.1. Map of Tottenham Court Road area surrounding St. Giles Hotel (n.t.s.).
Fig 3.2. Larger scale map of St. Giles Hotel and the Lazy Dog bar. (www.digimap.co.uk)
~~marks the position of the~~ Lazy Dog Bar in relation to it's urban context.

[51] Ittelson and Proshansky (1974) admit "the truth is that we are not really sure why people play" (Ittelson and Proshansky, 1974, p. 180).

The Lazy Dog specific to this study is located in St. Giles Hotel (Fig 3.2.) along Bedford Avenue on the southern end of Tottenham Court Road in London (Fig 3.1.). The hotel is Chinese-Malaysian owned and the bar is leased to a partnership of operators, who also run the restaurant adjoining the bar.

The nature of the Lazy Dog as a hotel bar ensures that its international clientele is varied and not bound by specifically British, European, Western or Eastern norms (although these cultural influences are present, they do not dominate or stand out); on an average Friday or Saturday evening, visitors of different nationalities have been easily distinguished in the bar.

Fig 4. Images of the Lazy Dog bar from the entrance area.

Fig 5. Images of the Lazy Dog bar.

Fig 6. Images of the Lazy Dog bar.

The bar-space shown comprises of fixed and movable furniture (Fig 4.-Fig 6.); the varying heights of fixed (and to a lesser extent, movable) furniture affect the visual properties of the space. The height variables are taken into consideration in the spatial models. [52]

[52] The distinction between movable and fixed furniture is mentioned with reference to Robson and Kimes' (1999, 2004) earlier description of "anchored furniture".

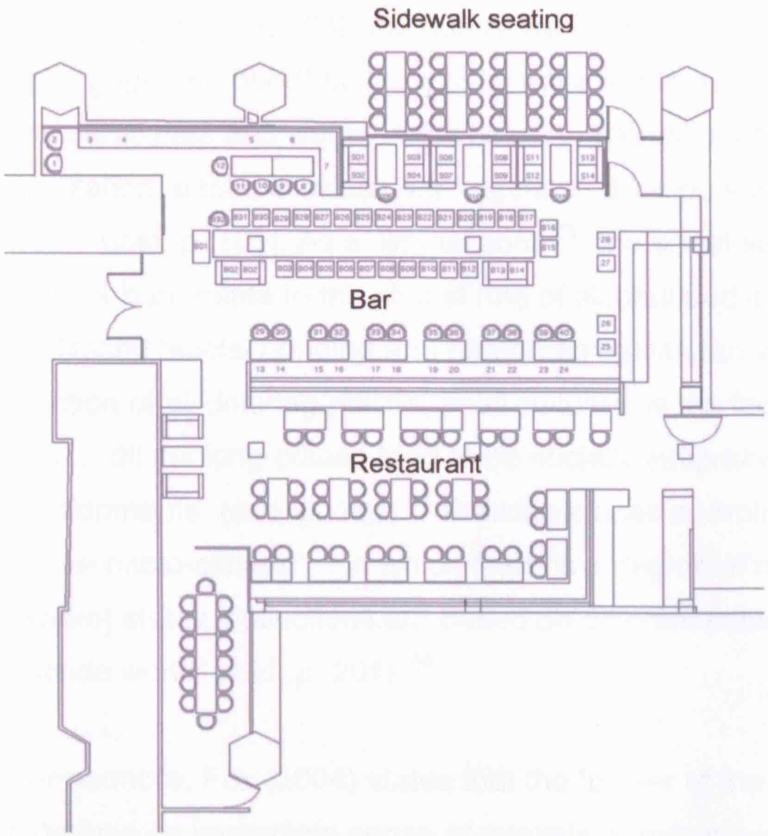


Fig 7. Plan layout of the bar-space.

Fig 8. Elevation drawing of fixed furniture in the bar-space.

1.3.2 The Hotel Bar as a 'liminal zone'

According to Fox (2004), the pub is the favourite 'social facilitator' of the English to "engage and bond" (ibid, p. 253); there are in excess of 50,000 pubs (and additional bars and clubs) in the country, patronized by 75 per cent of the adult population, a third of which are 'regulars', drinking socially "at least once a week" (ibid, p. 101). As a 'liminal zone'[53], the social scenarios that arise in a pubs or bars relate to the pivotal role of alcohol and its establishments in facilitating "social bonding and reinforces egalitarian values ... the primary function of *all* drinking-places, in *all* cultures, is the facilitation of social bonding, and ... all drinking-places tend to be socially integrative, egalitarian environments" (ibid, p. 101).[54] Drinking-places as liminal zones, "have their own 'social micro-climate'... in which there is a degree of cultural remission... [where] status distinctions are based on different criteria from those [of] the outside world" (ibid, p. 201). [55]

Furthermore, Fox (2004) states that the "power of the pub itself is often enough to induce an immediate sense of relaxation and conviviality, even without the social lubricant of alcohol" (ibid, p. 202) – a societal established convention where "pub equals play". Fox (2004) states the effects of alcohol increases the feeling of liminality (ibid, p. 227); mostly, drunkenness is not the goal, but acts as a facilitator in this process of part escapism, part suspension from everything external (socially and spatially), yet necessary to its well-being.

---

[53] Fox (2004) defines a 'liminal zone' as "a marginal, borderline state, segregated from everyday existence, in which normal rules and social constructions are suspended, allowing brief exploration of alternative ways of being" (Fox, 2004, p.226).

[54] She elaborates that this phenomenon is not exclusive to the English or British drinking-culture, but asserts that a relaxation of social rules is in such stark disparity to the rigid codes that bind English polite social conduct in other aspects of society, work and recreation, that the English preoccupation with alcohol stems from a "greater need for the drinking-place as a facilitator of social egalitarianism – as a liminal world in which the normal rules are suspended" (ibid, p. 101).

[55] Antrhopology defines "a 'liminal zone' [as] a marginal, borderline state, segregated from everyday existence, in which normal rules and social constructions are suspended, allowing brief exploration of alternative ways of being" (Fox, 2004, p. 226). Hillier (1984) applies the same notions of "liminality" to the nature of public, street and other such transitory spaces, as societal levelers.

The sociologist Ray Oldenburg (1999) essentially reinforces Fox's (2004) views, though in terms of the *third place* (Oldenburg, 1999; Oldenburg, 2001). Oldenburg (1999) explains, "daily life, in order to be relaxed and fulfilling, must find its balance in three realms of experience. One is domestic, a second is gainful or productive, and the third is inclusively sociable, offering both the basis of community and the celebration of it" (ibid, p.14). The *third place* is used to represent "the core settings of informal public life" (ibid, p.14).

According to Oldenburg (1999), "it is neutral, brief, and facile. It underscores the significance of the tripod and the relative importance of all three legs" (ibid, p.14).[56] The modern third place, Oldenburg (1999) remarks, becomes a much smaller scale phenomenon; the spaces perform their functions more effectively when its decor is "plain" and unassuming (Oldenburg, 2004, p. 17).[57] Today's society lacks a culture of gathering on a great scale to socialise and exchange information like the roman forum (perhaps largely due to the convenience of remote communications).[58]

Citing Jacobs (1961), Oldenburg summarizes the nature of sociability that makes a neutral third place essential to the health of individuals, families, neighbourhoods, cities' economy and society (Oldenburg, 1999, p. 22). Oldenburg (1999) rightly asserts "in order for the city and its neighbourhoods to offer the rich and varied association that is their promise and their potential, there must be neutral ground upon which people may gather... where

[56] Thus, "the first place is home – the most important place of all... The second place is [work], which work reduces the individual to a single, productive role." (Oldenburg, 1999, p.14).
[57] This description bears striking similarity to the appearance of the Lazy Dog bar.
[58] Historical examples, especially at the height of Greek and Roman society, "prevailing values dictated that the *agora* and *forum* should be great, central institution; that homes should be simple and unpretentious; that the architecture of cities should assert the worth of the public and civic individual over the private and domestic one" (Oldenburg, 1999, p. 17). This paper does not join the condemnation of technology as the reason for the deterioration of society; as Hillier and Hanson(1984) assert, modern communications aid in bringing people together, and as Canetti (1960) describes, humans always wanted to be in co-present "packs" (Canetti, 1960, p.93). Therefore, the more that we live remote lives, the more we desire to come together in each others presence.

individuals may come and go as they please, in which none are required to play host, and in which all feel at home and comfortable" (ibid, p. 22).[59]

The hotel bar under investigation might be considered a fractional *third place* due to the high turnover of guests; The hotel as a transitory place produces constant flows of people, rendering the familiarity of the third place unattainable. Regulars from the surrounding residential area, are few and keep to themselves. It fills some of the criteria for a third place but not as convincingly as for example, a pub or a neighbourhood coffee-shop does. Due to its transitory clientele one would not expect to find familiar friends or acquaintances randomly; meeting people would have to be pre-arranged and established group cohesion is reinforced by non-sociability with group-outsiders.

At the same time, some sociability is presumed to occur as (according to Fox, 2004, and Oldenburg, 1999) the atmosphere of sociable conversation facilitates the relaxing of social norms (and possibly, spatial norms). The liminality of the bar reinforces its ecology (cf. Barker, 1968), separated from external conditions; reiterating the notion of *transformation* in the individual and the social group as they cross a social and spatial threshold.[60] This paper asserts that applying spatial theory to the bar-space strengthens the behaviour-environment rhetoric, allowing new approaches to a familiar discussion.

---

[59] Jacobs (1961) observes, "Cities... are full of people with whom contact is significant, useful, and enjoyable, but "you don't want them in your hair and they do not want you in theirs either" (ibid, p. 22).

[60] There seems to be strong similarities in the spatial and social notions of 'threshold' as described in sociology, environmental psychology and architectural theory. As mentioned previously, Canetti's "crowd theory" (Canetti,1960) was concerned with the sodality of people in aggregate, and the nature of group-dynamics that makes a crowd more than the sum of its parts; his theories highlight that a group of people acquire properties that make it a consolidated entity rather than a mere aggregation of individuals. According to Cannetti (1960), a crowd *becomes* a crowd at the point of "*discharge*", when the "distinctions of rank, status and property" between men momentarily disappear (Canetti, p.17) and they are equally free from "their burdens of distance" (Canetti, 1960, p, 18) - spatial courtesies and accepted societal behaviour, particularly suitable to this discussion.

2. Analytical models

Investigative methodology

Expanding the notion that social (seat-choice) behaviour is largely based on a perceived spatial logic, this paper focuses on visual analysis to explain visibility potentials as a determining feature of perception; spatial models are constructed to organise space purely within the limits of the layout plan to demonstrate the visio-spatial properties of the space. During the weekends in July and August, 2007, a series of observations were also conducted and recorded using a small, wall-mounted digital camera; the recordings noted persons' seat-choice throughout the evening. The recorded behaviour is transformed from personal description (which is also useful) into empirical data that can be correlated with the predictive simulations to describe a relationship between seat-choice behaviour and spatial analysis objectively.

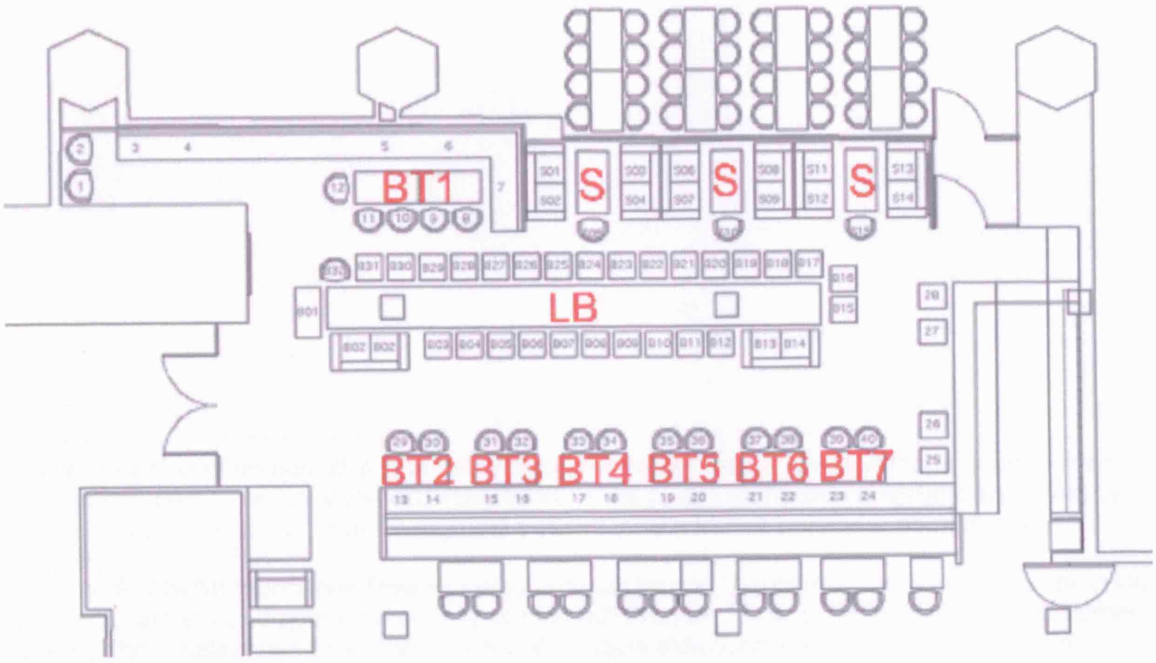


Fig 9. Layout plan of the bar-space with table and seat-code labels highlighted in red.

2.1. Isovists

Isovists were derived by Benedikt (1979) as measuring "visible space throughout configurations and the associated visual fields through space that they produce" (Turner, 2003, p.657).[61] Benedikt found that introducing isovists to architectural analysis freed the ties of "society and space... at the phenomenological level" that Thiel's methodology advocated (ibid, p. 659).[62]

The more recent use of *façade isovists* results as a derivative of point isovists as a hypothetical visual field of the surface, or the combined visibility of any points that fall along that surface. In most cases, as in the present study, façade isovists are used to determine the area in the system from which the surface is visible. In this study, *point* and *façade isovists* have been constructed to represent the visual field from identified positions (represented by a different seat code or façade surface), aiming to reveal patterns of visual properties that can be linked to perception.[63]

---

[61] The definition of an *isovist* is "the set of all points visible from a given vantage point in space, and with respect to an environment" (Benedikt, 1979, p. 47). Benedikt constructs an isovist by taking a two-dimensional slice through the volume visible from a particular point in space (Turner, 2003, p. 659).

[62] Benedikt (1979) found that Thiel's (1961) analysis lacked "a tool that can adequately describe architectural form and space as visually presented" (Turner, 2003, p. 659). According to Turner (2003), "the notation used by Thiel is a set of symbols indicating some categorisation of a continuous experience somewhere between a 'vague' (an environment consisting of a multiplicity of objects) and a "volume" (an environment defined by surfaces)" (Turner, 2003, p. 658). According to Benedikt (1979), the significance of these contours is that they "may be of use in the study of behaviour and perception; and ... they may be of use to identify architectural archetypes" (Turner, 2003, p. 658).

[63] According to Turner (2003), "Gibson (1979) introduces the concept of *optic flow*, which may guide an individual through a landscape", while Benedikt (1961; 1885; 1997) suggests "the rate of change of the isovist field... may be of use in investigating perception and behaviour" (Turner, 2003, p. 658).

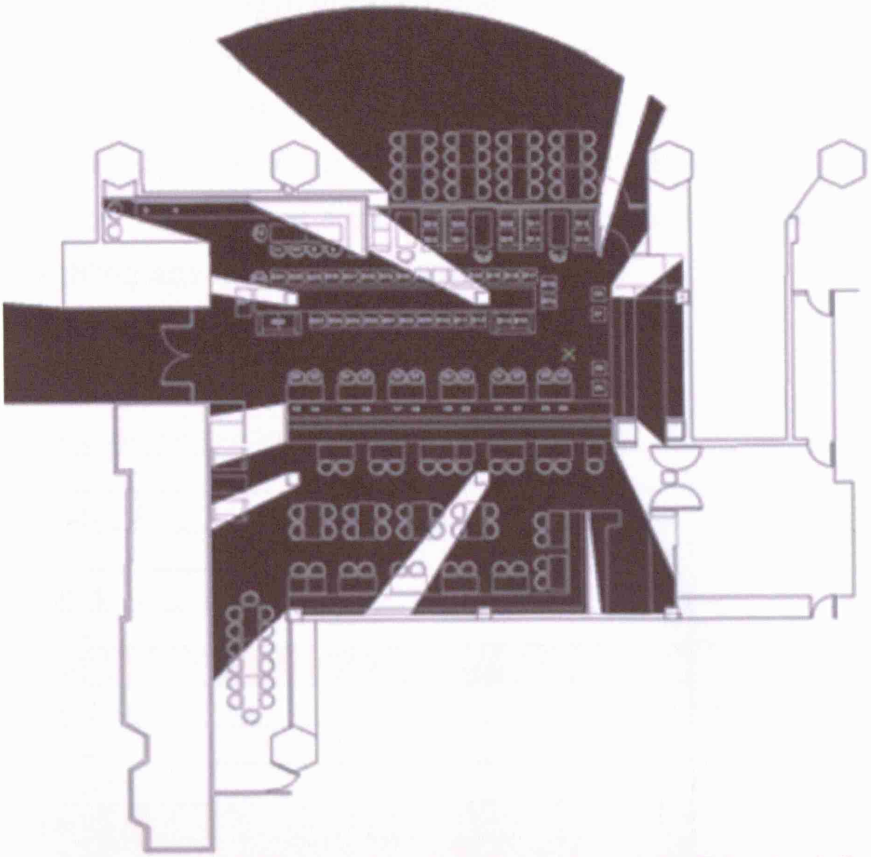


Fig 10. Standing point isovist 10. Refer to Appendix B for the full set of façade, standing and seated isovists generated for each seat code in the system.

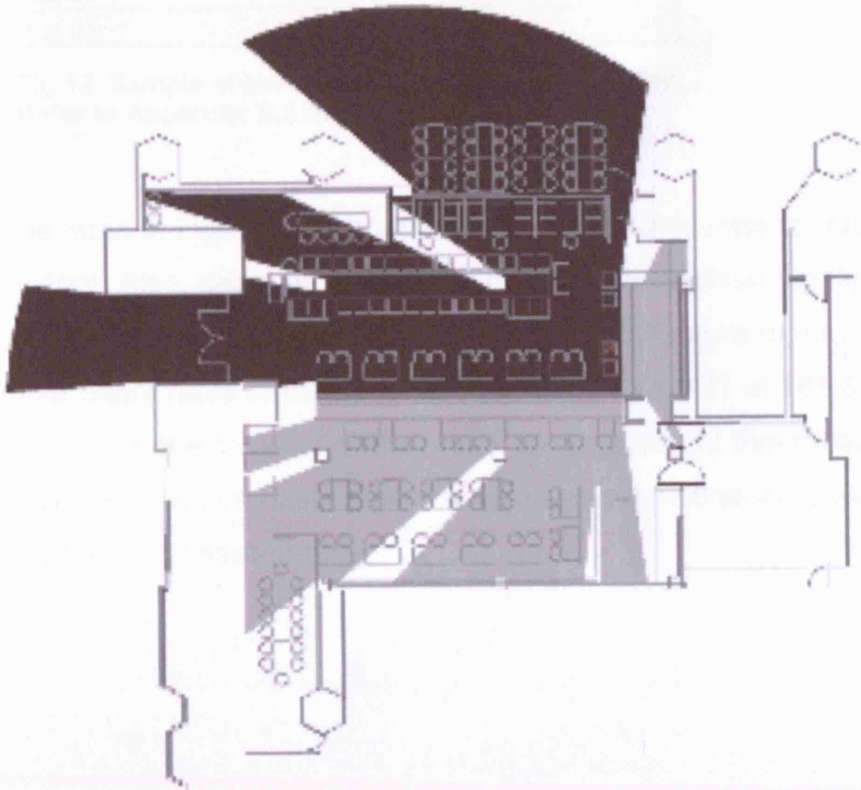


Fig 11. Seated point isovist 26. Refer to Appendix B for the full set of façade, standing and seated isovists generated for each seat code in the system.

An isovist was drawn from designated points that cover significant standing and seated positions, as the figures demonstrate (Fig 10.-11). From these, the total area of each isovist was recorded[64]. Findings showed that standing isovist 10 has the largest isovist area at 288.56 m^2 and the standing point-isovists as a category had a larger area than the seated ones (probably due to the height weighting applied to seated isovists.[65]

Seat codes descending	Seated Isovist Area (black) (m^2)
Standing 10	288.56
TV2	264.97
Seat 26	189.71
Seat 27	189.26
Seat 22	188.36
Seat B14	186.56
Seat 28	182.27
Seat S14	178.08
Seat 21	176.87
Seat 37	174.75
Seat 38	173.67
Seat 32	166.991
Seat 31	165.81

Fig 12. Sample of isovist areas in descending order. Refer to Appendix B.2 for the full table.

The table in Figure 12, shows the largest area isovists for each seat-type in the system. Also, seats at tables BT3 and BT6 have been highlighted in orange and yellow respectively. Although Seat 27 and 22 feature high-up on in the table the other seats have smaller isovist areas, with Seat 31 at 165.81m^2, isovist analysis alone failed to show conclusive results. At this initial stage, this paper hypothesises that having an increased visual field alone does not account for orientation or seat-choice.

[64] Refer to Appendix B. for the full table of isovist areas.
[65] Interestingly, the areas of standing point-isovists were generally larger than façade isovists.

2.2. Visibility Graph Analysis (VGA)

According to Tuner (2004), *Visibility Graph Analysis* (VGA) is defined as "a spatial analysis technique for urban and building spaces... which may also be applied to landscapes" (Turner, 2004, www.vr.ucl.ac.uk/research/vga). The method requires selecting a grid of nodes at specific distances from each other to form "graph edges between those points, if they are mutually visible, to form a *visibility graph*" (ibid.).[66]

Following Turner (2003), this paper uses visibility analysis to "make rigorous mathematical statements" about the system of the bar-space, correlating it with observed statistical phenomena, facilitating the application of "mathematical certainty" to the observed experience (ibid, p. 657). The results are later compared with existing studies mentioned earlier and their success in interpreting social behaviour.[67] Turner (2003) and Hiller (1984) state, "the *qualia* relating to the personal experience of a space" is unquantifiable, resulting in a "phemenological theory of the city or of building [that] is flawed" (Turner, 2003, p. 657). However, Turner states that even visibility methods in space syntax originate from "culturally bound" emphases; therefore, there is no objective way to determine the success of a design through social theory or empirically[68] (Turner, 2003, p. 657-658).

---

[66] Turner defines *visual integration* as being derived from Hillier and Hanson's (1984) research on integration, applied to "the *integration* of a point in the graph (an analogue of axial integration)" is derived from "visual depth" or "visual connectivity" defined as the "number of visibility turns from one location to another" (Turner, 2004, www.vr.ucl.ac.uk/research/vga). While *integration* is briefly defined as "a normalised (inverse) measure of the mean shortest path from the point to all other points in the system" visual connectivity is a translation of topological "connectivity" (found in axial maps) which calculates the number of lines "connected to another", to the visual field (Turner, 2004, www.vr.ucl.ac.uk/research/vga).

[67] Turner (2003) states that historically, the advancement of visibility methods has been dominated by "humanist, phenomenological, cultural, and Marxist approaches to geography and ... architecture". Turner (2003) cites Harvey (1973) as the origin of these approaches that claim that "any spatial analysis of a city (or a building) must relate to its sociological function at some level and, because the sociological function involves many inseparable variables, analysis of pure spatial form is all but meaningless" (Turner, 2003, p. 657).

[68] Turner refers to this standpoint as "the 'postpositivist' argument" (Turner, 2003, p.657-658). This term is a direct response to 'positivism' as mentioned earlier in the paper, described as being an essentially empiricalist point of view, in direct opposition to the phemenologist approach.

This study inherits Turner's (2003) theoretical standpoint in the use of VGA analysis; he states that to assess the "sociological effect of the built environment, we need to comprehend the entire *ecological process* in action. [Thus], we need to see perception as an active or dynamic process occurring between agent and the environment, allied to with the biological notion of autopoieses (Maturana and Varela, 1980)" (Turner, 2003, p. 658) [69]. The conventional assessment of visibility "in vacuo" separates the individual from the spatial as described in the critique of previous studies based in the man-environment paradigm (ibid, p. 658). According to Turner (2003), "direct perception regards the relationship between the occupant and the environment rather than attempting to gain access to the vernacular phenomenological idea of perception", merely addressing the "human – spatial interaction in the environment without confounding spatial and social variables" (Turner, 2003, p. 659). Turner's solution is to focus on "visual relationships rather than a strict interpretation of direct perception" (ibid, p. 659).

With reference to Hiller and Leaman (1973) and Hiller and Hanson (1984), Turner (2003) cites evidence from cognitive science "that the natural outcome [the process] tends to be similar to the actual outcome, regardless of subject input... that the process is a product of the task to which the organism relates, rather than the evolution or nurture[70] of the organism (Dale and Collett, 2001)" (Turner, 2003, p. 659).

---

[69] According to Turner (2003), previous "visibility literature build their analysis around the psychological theories of Gibson (1950; 1979), where the occupant's understanding of the environment is placed outside the model, and instead his or her ecological relationship with the environment is considered through a set of affordances representing these relations; that is, the occupant is engaged in direct perception of the environment" (Turner, 2003, p. 657-658). The theoretical background of this study has already suggested that the superficial study of direct perception of the environment is problematic (Turner, 2003, p. 658).

[70] This comment refutes Environmental Psychologist claims that socio-spatialial properties of the environment is culturally-bound, which cannot account for observed evidence.

Turner (2003) proposes that visibility analysis is "the visual ecological[71] process which occurs between the occupant and space... [where] a process model can be constructed where sociological relationships are abstracted upwards from a layer of individuals, so that the physical relationships between aggregate behaviour and the environment can be investigated as a natural phenomenon, without individuation in the different languages of spatial and social variables" (Turner, 2003, p. 673) advocated by theories based on Gibson (1979). Turner's (2003) visibility analysis provides a *hermeneutical dialogue*[72] between visibility and visual inhabitation (thus, providing insight into situatedness and embodiment in the *life-world*) (ibid, p. 674).

The VGA models in this study took into account *visual connectivity*, *visual integrationHH*, *visual control* and *visual controllability*. Four different layout models were run using the Depthmap[73] software to determine the most suitable that would correlate with observed data and intervisibility. Initial results show that *visual control* measures in all models seems most evident and successful; limiting the visual analysis field only to the interior system of the bar area, excluding restaurant and exterior views, indicated the most promising results (Fig 21.).

[71] A reminder of Barker's (1968) basic *ecological* argument of treating the environment as a whole entity. In this case, the visual properties of a space is discursive at an all-inclusive ecological level rather than based on the visibility from each participant or point in the system.
[72] Turner (2003) states that *hermeneutical dialogue* "represents any interaction or relationship in the process of inhabitation, be it at the level of walking along a road or the enjoyment of an abstract painting" (Turner, 2003, p. 674)
[73] The Depthmap software emplyed int his study was created by the Space Syntax Laboratory - part of The Bartlett Graduate School of Architecture, University College London.

2.2.1. VGA models

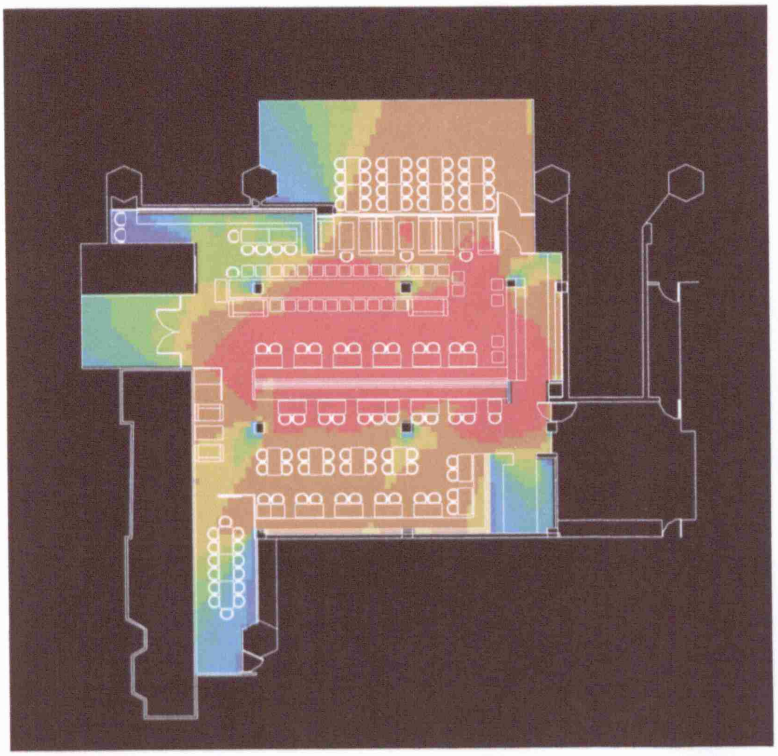


Fig 13. Visual Connectivity measure of the full bar and restaurant model.

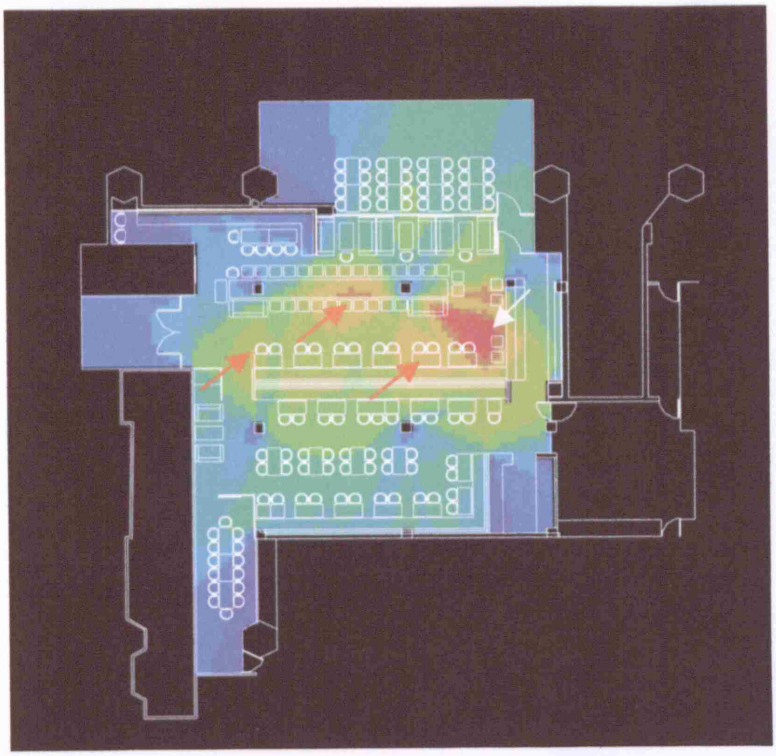


Fig 14. Visual IntegrationHH measure of the full bar and restaurant model. The white arrow indicates the only concentration of high integration, while the orange arrows point to patches of intermediate visual integration.

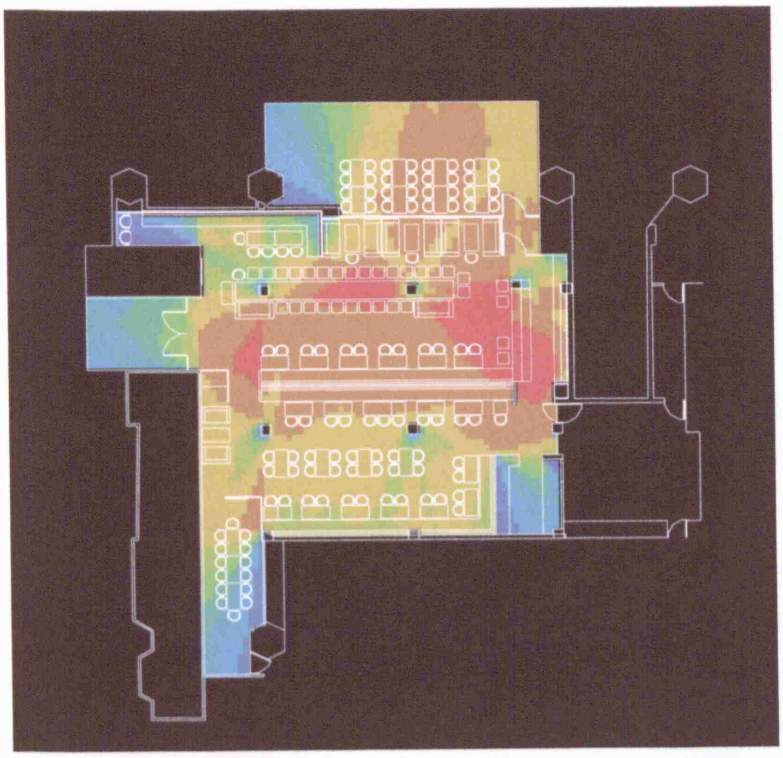


Fig 15. Visual Control measure of the full bar and restaurant model.

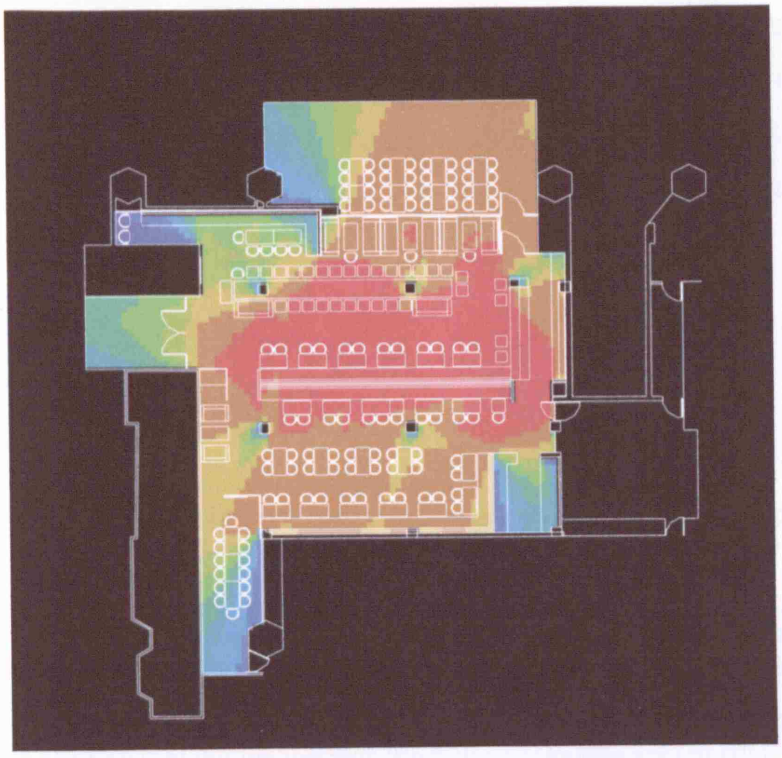


Fig 16. Visual Controllability measure of the full bar and restaurant model.

The "Full" bar-and-restaurant model takes into account the space as a management whole, as both the bar and the restaurant are operated by the same managers and staff; the kitchen of the restaurant serves the bar visitors and vice versa. Operationally and in decor, they can be view as a cohesive space;[74] the banquette seating that constitutes the bulk of the partition, is not "concrete" in a sense and there is partial visibility from 1200mm above the floor-finish height to the ceiling. Therefore, the restaurant space is visible form bar space is one is standing at full height, but less so if one is seated.

These models show the full visibility of the space at standing height through the measures of *visual connectivity*, *visual integration* (HH), *visual control* and *visual connectivity*; however, they do not seem to correspond with the experience of the bar-space, explained probably by the fact that the *standing* visual field is less interesting to the focus of seat-positioning in this study. Interestingly, the visual integration and control measures feature in high concentrations around the main bar and low bench areas (highlighted red in the spectrum[75]), in this global spatial system.[76]

It is noted in this "full" model, as with the following models, that visual controllability is not the antithesis of visual control, as might be misinterpreted. In the current system, much of the area highlighted as displaying the highest control properties are also highlighted "red" in the visual-controllability-model.

---

[74] The two spaces were design based on the same materials and concept; as the above models (Fig X. – Fig Y.) shows, the division between the two spaces are cosmetic and there is cross visibility through a transparent glazed screen.

[75] In space syntax methodology, colours range from red to indigo according to highest to lowest values in the various measures. Therefore, an area highlighted as red would have e.g. high integration values or control values; a turquoise or blue area is less integrated or has less control.

[76] Later, the focused VGA on the bar-space (Fig. X – Fig. Y) highlights the same areas, indicating that though logically the overall colouring should differ between system sizes, these do not, and show a similarity in properties. Therefore, they might be more linked that first believed ad perhaps it is that the models focused on the bar space alone produce more refined results.

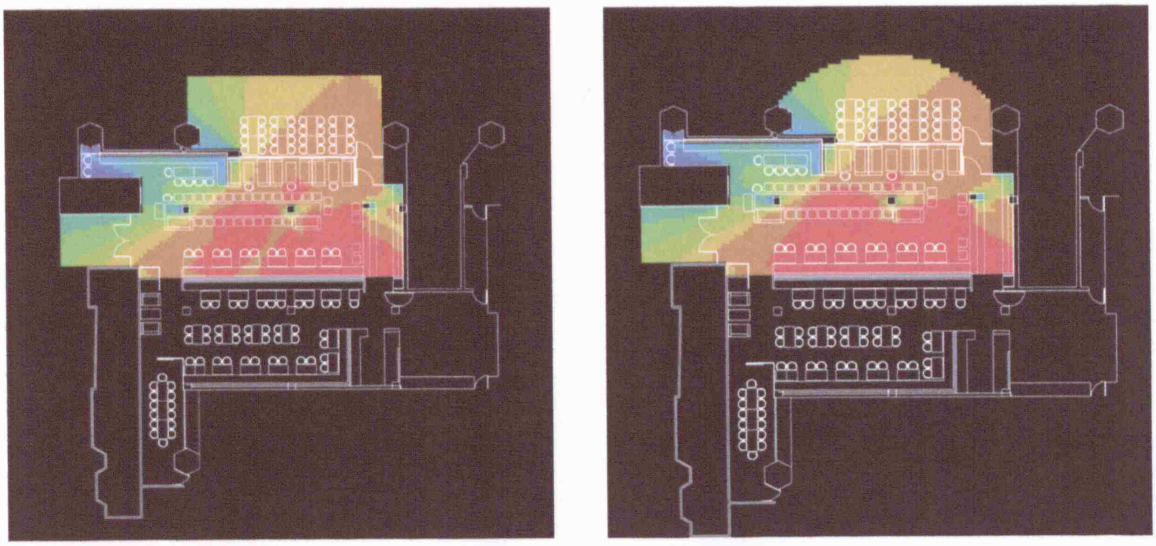


Fig 17. Visual Connectivity measure of the bar (including exterior) model; Fig 17.1. (left) model follows the line of the sidewalk kerb and Fig 17.2. (right) has a radial visual field of the exterior area through the glazing.

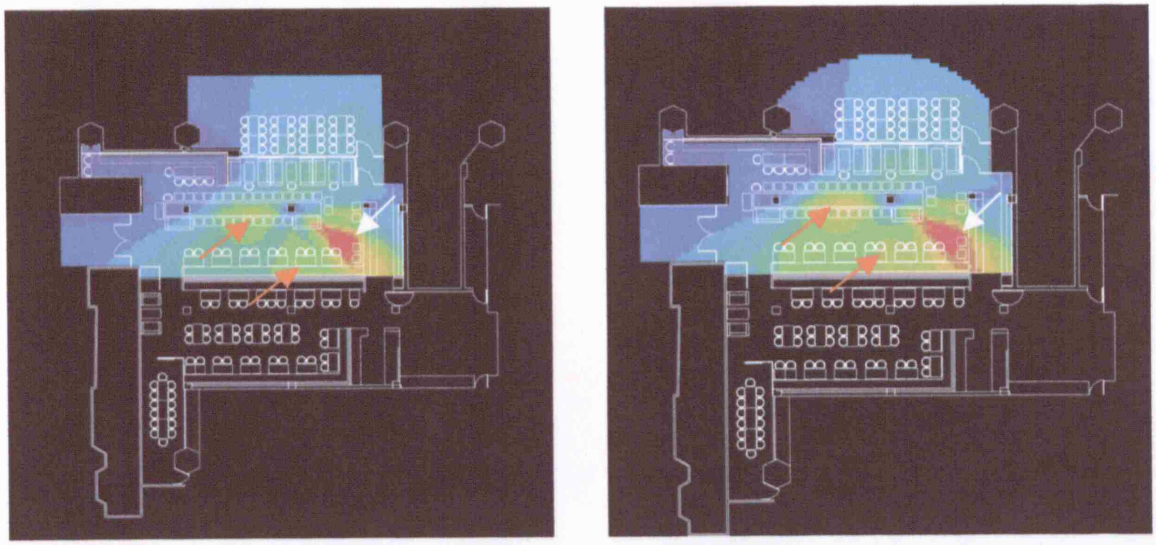


Fig 18. Visual Integration measure of the bar (including exterior) model; Fig 18.1. (left) model follows the line of the sidewalk kerb and Fig 18.2. (right) has a radial visual field of the exterior area through the glazing. The white arrow indicates the only concentration of high integration, while the orange arrows point to patches of intermediate visual integration.

Comparing the VGA models shown in Figures 17.1 / 18.1. and 17.2 / 18.2., the colouring of the areas are similar; the slight differentiation in the analysis boundary affects the area surrounding the column most central to the VGA field, and that the area in front of the main bar marked ↙ on Fig 18.1. and 18.2. (in white) indicates high visual integration (even in the integration model of Fig X.), an important feature in the functioning of the bar-space. In terms of design, a golden backlit façade draws additional attention to the main bar (Fig 4.).

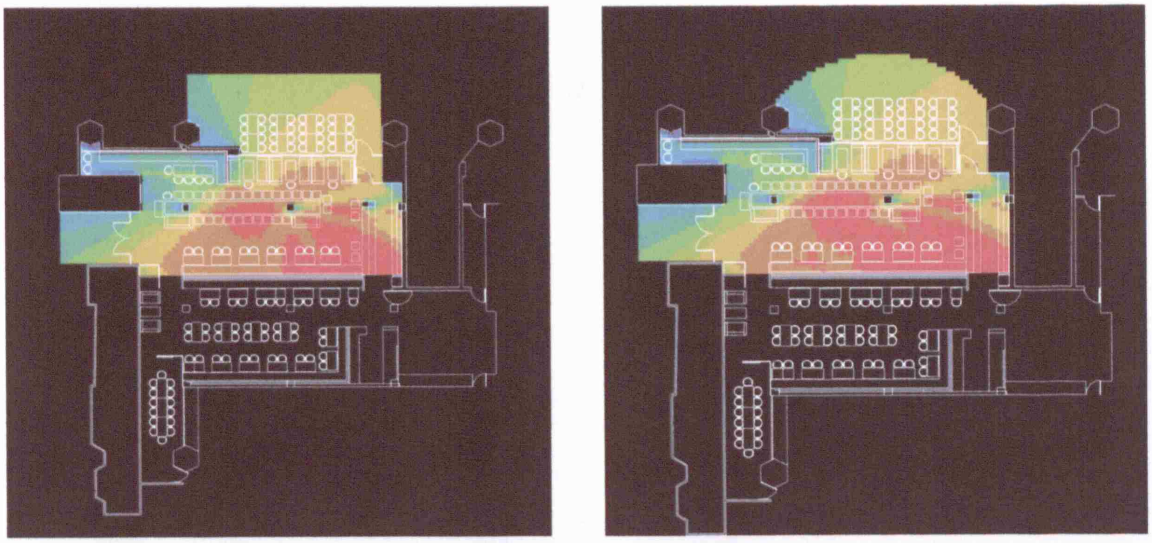


Fig 19. Visual Control measure of the bar (including exterior) model; Fig 19.1. (left) model follows the line of the sidewalk kerb and Fig 19.2. (right) has a radial visual field of the exterior area through the glazing.

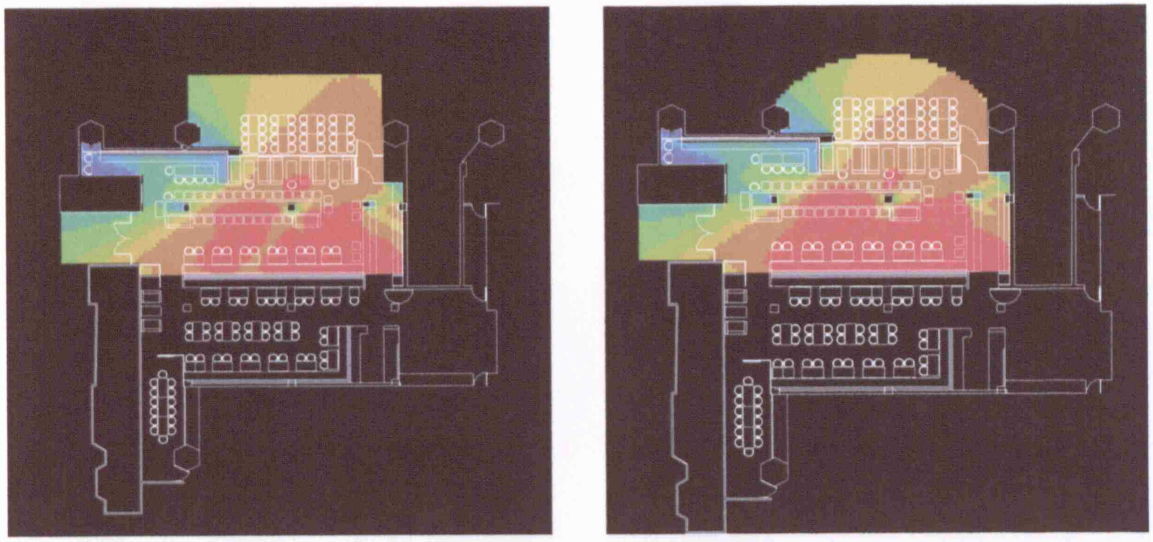
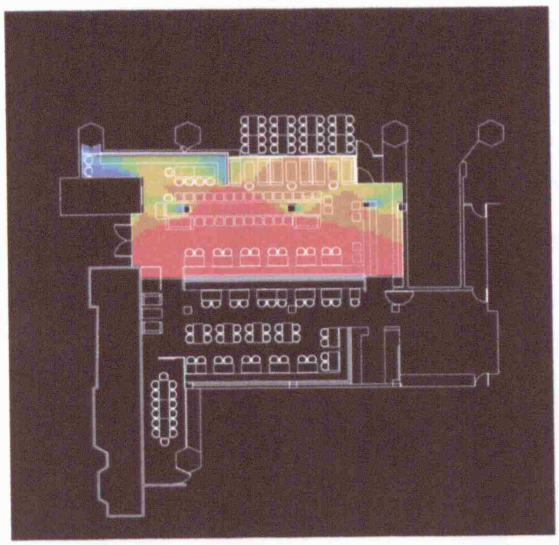


Fig 20. Visual Controllability measure of the bar (including exterior) model; Fig 20.1. (left) model follows the line of the sidewalk kerb and Fig 20.2. (right) has a radial visual field of the exterior area through the glazing.

Comparison of these four models shows slight differences; particularly, Fig19.2. high-lights the rectangular table BT3 (see Fig 9.) as an island of high visual control; this corresponds later with observed findings and with the model best correlating with observed behaviour.



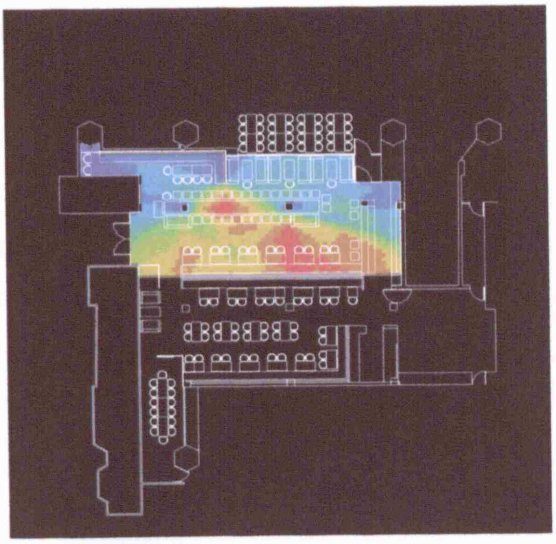
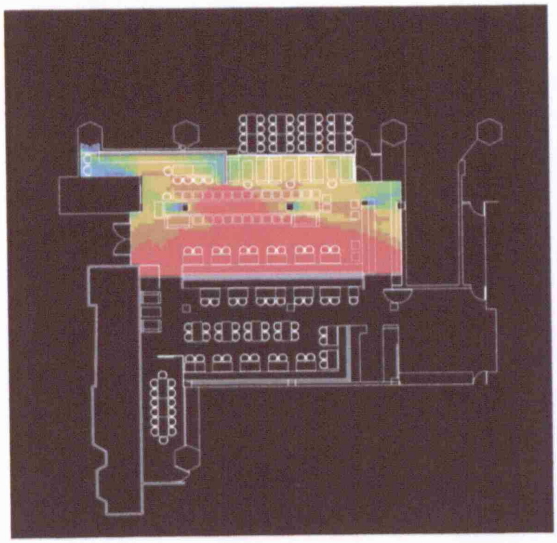


Fig 21.1. (left) Visual Connectivity measure in the interior bar-space system.
Fig 21.2. (right) Visual Integration(HH) measure in the interior bar-space system.



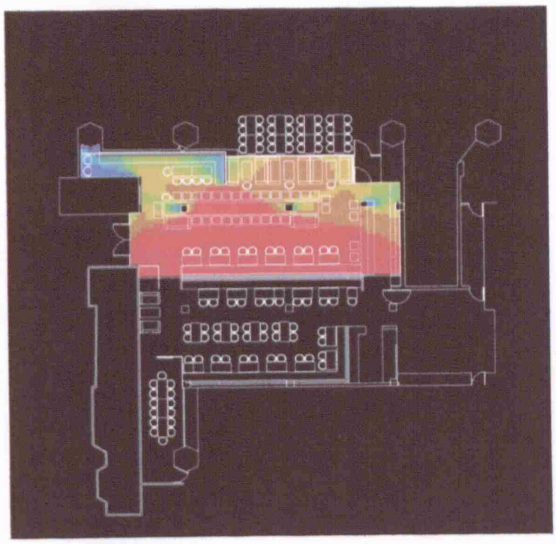


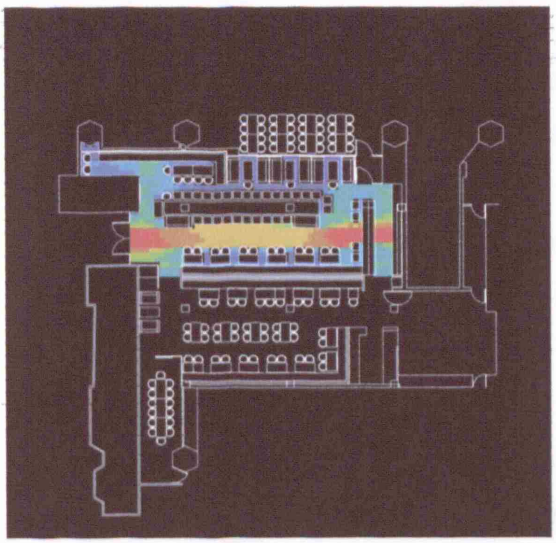
Fig 21.3. (left) Visual Control measure in the interior bar-space system.
Fig 21.4. (right) Visual Controllability measure in the interior bar-space system.

The VGA analysis of the interior bar-space-only system (Figure 22.1., 22.2., 22.3., and 22.4.) highlights a different interpretation of previous models of integration in this study; in a way, integration moves away from the main bar and towards the centre of the bar-space. In this model, BT6 is surrounded by a small area of high visual integration values, and BT2 is partially coloured orange, indicating that it is relatively well integrated, but not as much as BT2.

The distinguishing factor in this integration model (Fig 21.2.) is that the areas of "red" are quite specific; the "redness" in visual connectivity, control and controllability (Fig 21.1, 21.2. and 21.3.) also incorporate Tables BT2, BT3 and BT6, but they do not pick these tables out distinctly, from its surrounding area. A third "red" space covering a central portion of bench seating in the middle of the bar-space highlighted in the model's integration measure (Fig 21.2.) corresponds to the areas picked out in the "global" model of the bar/restaurant area (Fig 14, 15.) and implied in the other integration measures, albeit with more intensity.

2.2.2. Projection Polygons

The term *projection polygon* was coined by Peponis (Peponis, Wineman, Dalton and Dalton, 2004) to refer to a VGA model at just above floor or knee-height. Traditionally, VGA measured visibility properties in relation to integration, control and controllability as mentioned above. The projection polygon is a theoretical model of possible positioning in space (rather than topological movement of axiality) using VGA measures.[77]



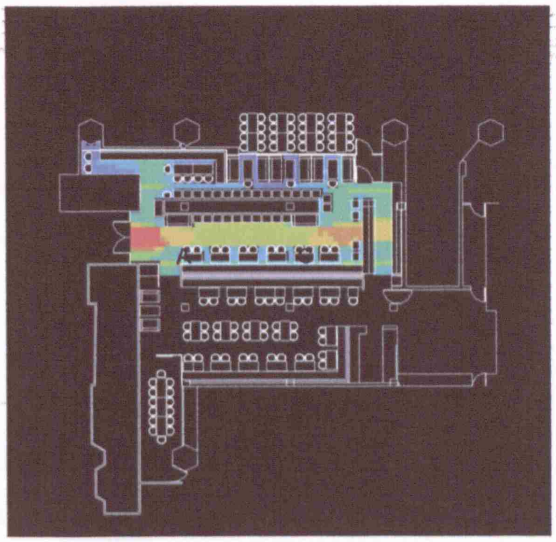
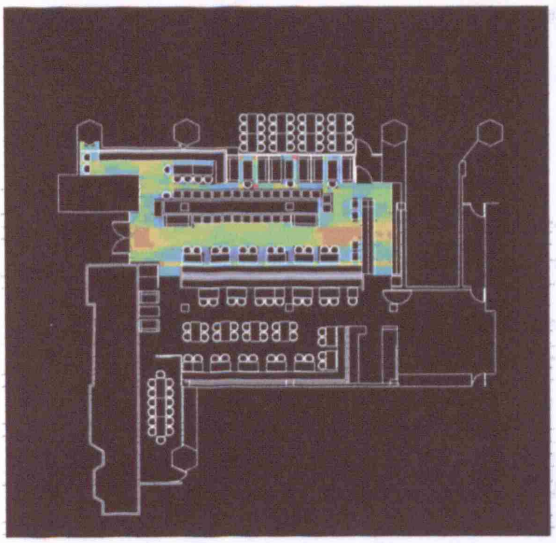


Fig 22.1. (left) Projection polygon Connectivity measure in the interior bar-space system.
Fig 22.2. (right) Projection polygon Integration(HH) measure in the interior bar-space system.



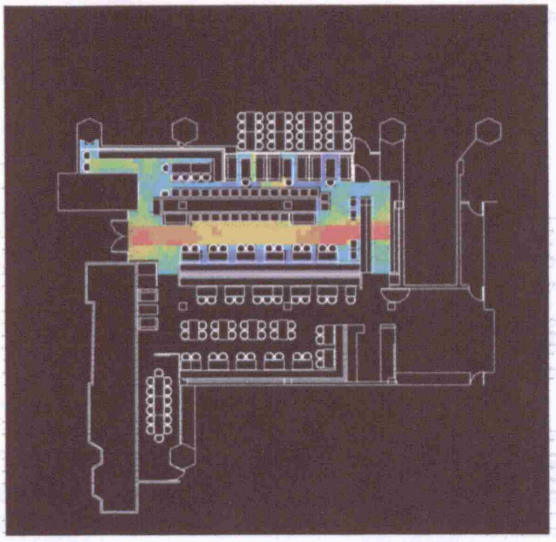


Fig 22.3. (left) Projection polygon Control measure in the interior bar-space system.
Fig 22.4. (right) Projection polygon Controllability measure in the interior bar-space system.

[77] According to Peponis, Wineman, Dalton and Dalton (2004), the area of a projection polygon measures the amount of space from which the vantage points directly accessible along an uninterrupted straight line.

The projection polygon measures highlight the main entrance and bar areas in "red" with great accuracy; it is in these areas that people would logically gather, perhaps pausing to assimilate the environment of the bar, to wait to be seated for the restaurant or to wait for their turn at the bar. However, it is also noted that in this layout, the areas in indigo/blue are perceived as congested with furniture, even without VGA demonstration.

2.3 Inter-visibility Graph and Matrix

Inter-visibility properties are represented in this study as a *visibility matrix* or "adjacency matrix" consisting of "a combination of one-way and two-way links" (Braaksma and Cook, 1980, p. 191).[78] The *visibility index* created by Braaksma and Cook (1980) and employed by Modak and Patkar (1984) provides quantitative explanations to support qualitative information observed of human *orientation*[79].

Inter-visibility is measured by the technique devised by Braaksma and Cook (1980) to measure the directed visual relationship of objects by linking them together. Simply defined, they represent "*sight lines*" (Braaksma and Cook, 1980, p. 191). In previous cases (Braaksma and Cook, 1980; Modak and Paykar, 1984; Peponis, Wineman, Dalton and Dalton, 2004) sight lines indicated the potential visibility between objects (e.g. exhibition or retail stands), rather than between seated positions of persons.

[78] In this case, potential visibility is assumed to be mutually directed.

[79] Braaksma and Cook (1980) cite Howard and Templeton's somewhat lengthy definition of "human spatial orientation" (1966) as "geographical orientation" – "a way that a person is facing with respect to the objects on the earth's surface and that this involves a skill in the ability of a person to maintain a sense of direction when moving about. Visual perception of the environment plays a major role ion the maintaining a person's sense of direction" (Braaksma and Cook, 1980, p. 189). Modak and Patkar (1984) define *orientation* as "a correct sense of direction" that involves the use of "landmarks or a signage system, such that [for example] the passenger [in a transport terminal] is provided guidelines through visual perception and without the need for any enquiry" (Modak and Patkar, 1984, p. 116).

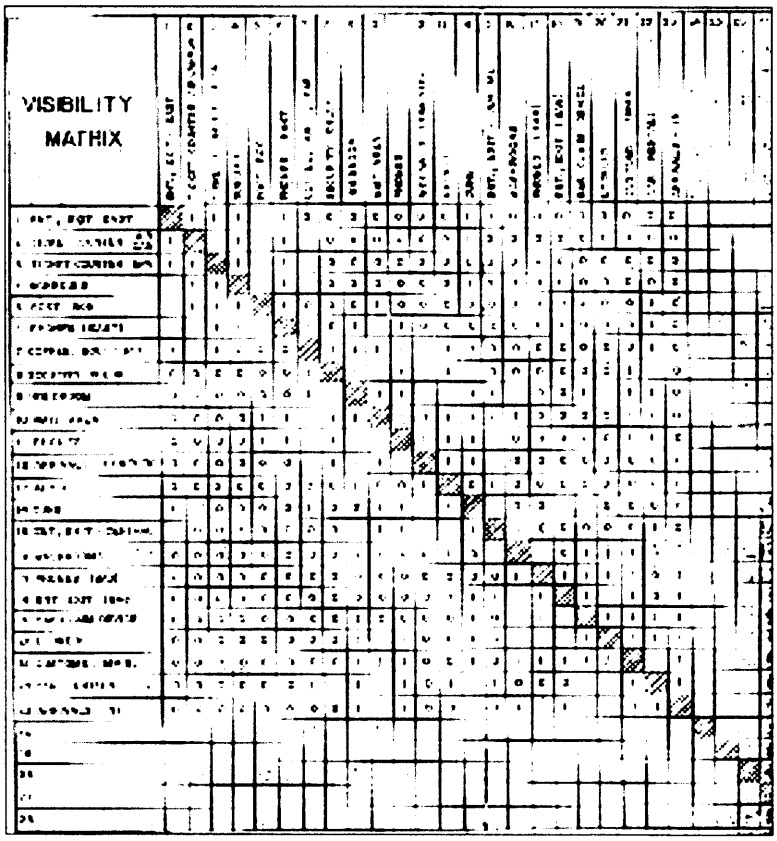


Fig 23. Braaksma and Cook's example of a visibility matrix as adopted by this study. (Braaksma and Cook, 1980, p. 196)

As Modak and Patkar (1984) explain, the visibility matrix aids in calibrating sight lines[80], which provides a direct relationship between the importance of spatial positioning, visibility and perception; furthermore, the *visibility index* illustrates the ratios (in percentage) between different spatial systems and provides a basis for comparing the efficiency of designs in terms of orientation and navigation.

[80] A visibility matrix "is constructed by making the entries L_{ij} equal to 1 if a sight line is found to exist from node *i* to node *j*; or else it is put equal to 0. This is followed by the calculation of a visibility index (*V*)" (Modak and Patkar, 1984, p. 116). Sight lines are represented empirically in graph-form to simplify the task of recording the vast amount of data that will render a layout plan indecipherable.

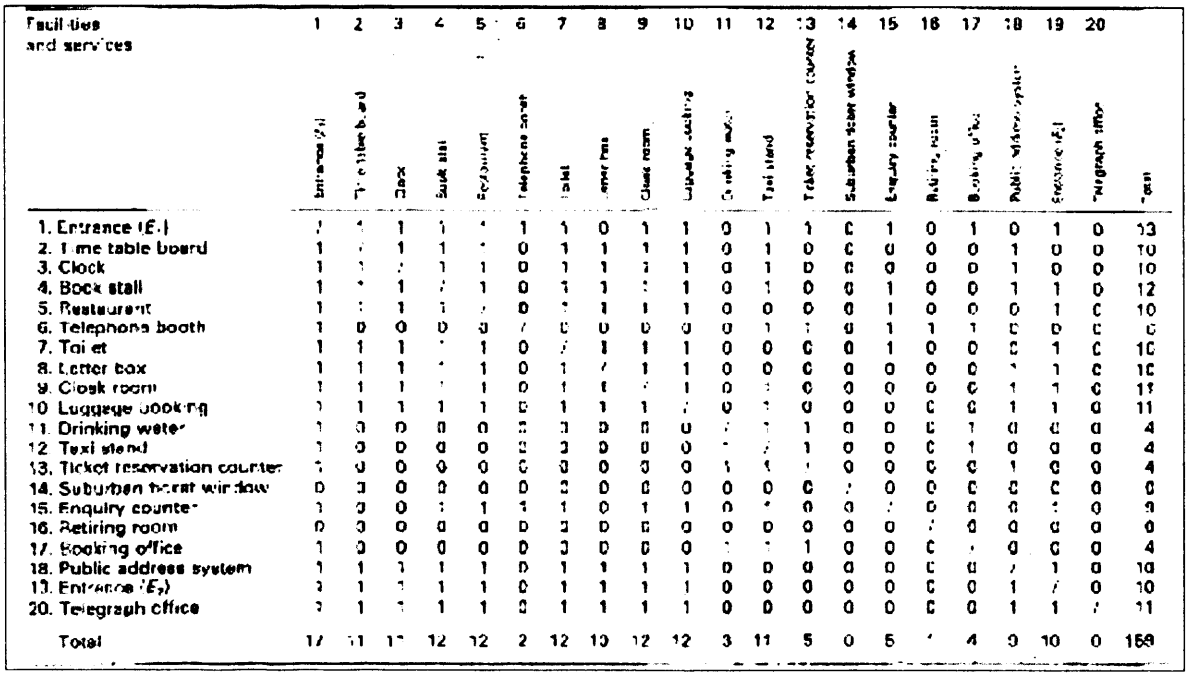


Fig 24. Modak and Patkar's (1984) example of a visibility matrix of Bombay Central Station. (Modak and Patkar, 1984, p. 121)

Their paper develops the matrix further to calculate the "the amount of visibility and thus orientation can be measured by how close to 100% the actual visibility gets" in the system (Braaksma and Cook, 1980, p. 192). The resulting *visibility index*[81] assigns groups of objects with a value that can be measured "to show how visible a node is" in relation to the whole spatial system (Braaksma and Cook, 1980, p. 193).

Braaksma and Cook (1980) state, "the method is based on the premise that human orientation is a function of the visibility of the destination that the person is moving towards" (Braaksma and Cook, 1980, p. 201). The present study aims to use this method to demonstrate the intervisibility that occurs between more or less static seated positions in a spatial system, rather than a goal-directed movement-orientation study, as it relates to individual and/or group orientation in space.

[81] The formula of the visibility index that results from a visibility matrix is useful to calculate and compare not only visibility levels from individual points but also the aggregate/percentage of visibility levels of sub-areas or clusters of objects. In addition, different types of spaces can then be compared in terms of overall visibility levels; the layout and architectural space affects visual perception is used to determine the success of the design in allowing people to orientate and navigate through the space (Modak and Patkar, 1984, et al.).

Banq Seats Descending	Adjacency (Full)
Seat 32	84
Seat B26	81
Seat B24	80
Seat B25	80
Seat B27	79
Seat B28	79
Seat B06	78
Seat 19	77
Seat 20	77
Seat 36	77
Seat 38	77
Seat 17	76
Seat 18	76
Seat 34	76
Seat 37	76
Seat 16	75
Seat 24	75
Seat 21	74
Seat 22	74
Seat 33	74
Seat 39	74
Seat 31	73
Seat 40	73
Seat 15	72
Seat 29	71
Seat 30	71
Seat 13	70
Seat 14	70
Seat 05	41
Seat 06	41
Seat 04	36
Seat 11	32
Seat 07	31
Seat 03	24
Seat 02	15
Seat 01	8

Key:

	Table BT2
	Table BT3
	Table BT4
	Table BT5
	Table BT6
	Table BT7
Seat B26	Highest "Full" adjacency for low-bench seating
Seat 32	Highest "Full" adjacency for all seating types
Seat 01	Lowest adjacency for all seating types

Fig 25. A sample of significant inter-visibility values derived from the adjacency matrix (Appendix C), arranged from highest to lowest. For the full and variations of this table, refer to Appendix A.

From the isovists, it was straightforward to determine the other seats visible from the originating seat-code. From this the *visibility matrix* was derived, using the symbol "F" to represent "full" visibility and "P" to denote a "partial" view of the seated-position. The resulting matrix (Appendix C.) gives a clear graphic interpretation of the visibility between these positions, while Appendix A. shows the different ways the matrix was calculated in terms of full and partial visibility.

Interestingly, the total number of visible seats calculated for each coded position proved more conclusive than isovist areas and produced indicative results when compared to observed seat-choice. Banquette Seat 32, at Table BT3 had the highest inter-visibility value at 84, followed by a series of low-bench seating. In Figure 25, seats are coloured according to table groupings, introducing the relationship between tables and visibility.

3. Observations

Observed footage was collected and transposed using *time-lapse* techniques popularised by Whyte (1980), in which he noted the occupancy of a public bench over a period of time. Whyte's study hypothesised that people have an intuitive sense of the pleasant-ness of a "place"; his study showed that "although "the turnover [was] heavy,... the number on the ledge at any time stays remarkably uniform" (ibid, pp. 70-71). According to Whyte (1980), results were "not constricted by lack of space", rather he asserts that "in free-choice situations such as this, evidently, capacity tends to be self-leveling, and people determine it rather effectively " (ibid, pp. 70-71).[82]

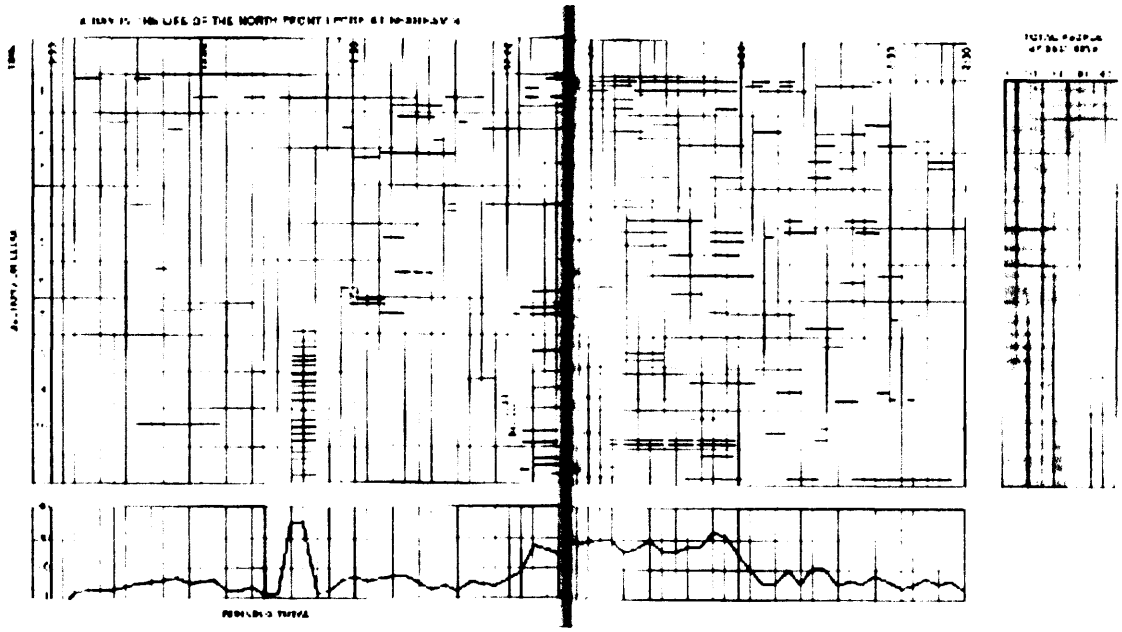


Fig 26. Diagram representing observed time-lapse video footage of ledge occupancy entitled *A Day in the Life of the North Front Ledge at Seagram's.* (Whyte, 1980, pp. 70-71)

[82] With reference to earlier explanations by studies in optimum distances and personal space (studies in Environmental Psychology; Mehrabian and Diamond, 1971; Argyle and Dean, 1965; Batchelor and Goethals, 1972; etc.), this method deals with the space system ecologically and therefore, is a more graphically comprehensible method of demonstrating person-positioning and possible orientation in the ecological spatial system.

The codes assigned to each seat in the intervisibility graph are again used to record the occupancy of seats in 15-minute-intervals. The result is an *occupancy matrix*[83] based on Whyte's (1980) *A Day in the Life of the North Front Ledge at Seagram's* (Fig 26.).[84]

Fig 27. Still Image taken from a frame of observation video footage dated Friday, 10pm; 13 July 2007. Refer to Appendix D. for full set of images.

Fig 28. Still Image from a frame of observation video footage taken at an alternative angle that proved less suitable, 11pm; 20 July 2007.

Note: The still images are of poor printed quality as they are taken from recorded footage and light levels in the space are already low.

---

[83] The term "occupancy matrix" has been used to describe the table showing the observed occupancy of seated positions over time. Refer to Appendix D. for the full matrix.
[84] Perhaps the current matrix will can be called *Weekends at the Lazy Dog*.

Fig 29. Sample sequence of image stills taken from video footage, showing the morphology of group orientation over time (at unequal intervals), 10pm-4am; 11 August 2007.

3.1 Preliminary descriptive findings

Observed behaviour and spatial occupation showed that two basic processes of seat-choice were taking place. Firstly, discrete groups of people or individuals (strangers) would sit a table or a seat (sometimes 2 seats) apart from those already seated; secondly, banquette seat occupancy seemed to correspond to areas highlighted in earlier VGA and inter-visibility spatial models. The bar seemed to have two peak periods: firstly, between 5pm – 6.30pm in the evening when a number of "suits", presumably working in the area or the hotel, come in for a drink, but do not stay fort he duration of the evening. Due to its late closing time, the bar experiences its second peak at about 11pm when most pubs shut. Customers arriving at this time are mostly guests returning from celebrations elsewhere, e.g. larger groups of "hen" parties.

On a few evenings when observations were undertaken, the bar stayed fairly busy from 11pm until 3-4 am; usually this would be a Saturday night/Sunday morning. Conversations with bar staff revealed that the recent smoking ban has had dire consequences on business as the bar closes its outdoor facilities at 10pm. However, it was noted that towards the end of the observation period, the bar became more crowded as people got more accustomed to the ban and adjusted their social-drinking habits accordingly.

Fig 30. Still Image taken from a frame of observation video footage showing the occupation of popular tables BT2, BT3 and BT6 that also show up on VGA analysis; dated Friday, 13th July 2007. The red outlines highlight group positioning.

Fig 31. Still Image taken from a frame of observation video footage showing the occupation of popular tables BT2, BT3 and BT6 that also show up on VGA analysis; 10pm, Saturday, 28th July 2007. The red outlines highlight group positioning.

Fig 32. Still Image taken from a frame of observation video footage showing the occupation of popular tables BT2, BT3 and BT6 that also show up on VGA analysis; 1am, Saturday, 28th July 2007. The red outlines highlight group positioning. See Appendix D. for full set of image stills.

Fig 33. Still Image taken from a frame of observation video footage; 10pm Saturday, 4th August 2007. The red outlines highlight group positioning. See Appendix D. for full set of image stills.

Briefly, the tables highlighted in Figure 30.-33. are occupied most of the time. Sofas are observed as first-choice seating when the space is relatively empty (with a maximum of 5 people) in the early evenings, but not predominantly over the course of the night. Banquette seats are preferred before bench-seating unless seats are perceived to be an invasion of another group's space. Additionally, people would rather leave the bar-space for the additional seating in the restaurant or in the hotel lounge, than standing around; this could be explained by the low height of the bench that dominates the middle of the bar space[85], leaving standing visitors uncomfortable in the height disparity between those standing and those seated.

When the bar is busier, seat-choice patterns are more difficult to predict, as choices are dependent on restricted availability. In the still-images shown, Table BT6 is occupied except for in Figure X. The next section briefly introduces the theory of *chance* or *randomness* that partly accounts for positional sequencing.

[85] Apart from two relatively slim columns, there are no other physical structures at eye level in the middle of the bar. The two lamp shades hang at eye-level, but cannot be considered "anchored" in the sense that Robson and Kimes describe (Robson and Kimes, 2005). Also, the lamps hang over the bench-top and immediate standing room is obstructed by the low-bench seating.

3.2 Spatial Probability / Randomness

Aczel (2005) states the "probability theory ... of aggregation" is a "statistical phenomenon" (Aczel, 2005, p.57); this means that absolute randomness is impossible. Even the observed findings of this study in seat-choice has found "pure randomness leads to partial (and often unexpected) aggregation"[86]; following Aczel's (2005) theory, "it is very unlikely that [sequences] will alternate perfectly... it is more likely, by the rules of chance, that some – though never perfect – aggregation will take place" (Aczel, 2005, p.56). This theory asserts that the aggregation of people to a certain seat might not depend on anything more than coincidence.

However, this paper suggests that although seat choice is random in the sense that people are not coerced or overly encouraged to make particular seat-choices, the visual properties of how a person perceives the space creates this pattern of preferred seat-choice. It is arguable that in this site-specific case, the spatial aggregation taking place is partly explained by individual perception that may imply a sense of territoriality, crowding and privacy in terms of spatial perception at a localised "personal space" level (rather than at a paradigmatic level).

When more popular seats are taken, the choice between similarly advantageous visibility positions, people seem to choose seats in close enough positions to other customers, but 1 table or 1 seat away (sometimes 2-places: regardless of the metric distance, the recurring "distance" is that of a "place" away), perhaps in a gesture of respecting the other's personal space. Also, people like to spread out to achieve "eveness"[87]; if they consider an area too crowded, they will sit in a less crowded (though, not totally isolated) place.

---

[86] Although randomness occurs partially in everyday instances (explained by coincidence), noticable aggregation is often a result of a relation with another factor rather than pure randomness.

[87] Eveness is closely related to randomness as it has been said that human perception often mistakes *randomness* for *eveness*, and prefers to organize things in this way.

Griffiths and Quick (2005) comment, "members of the group sit close enough together to emphasise their identity as a group, and to maximise the ease of conversational information flow" (Griffiths and Quick, 2005, p.455). According to Griffiths and Quick (2005), "This is not about territoriality", but rather optimising the balance of linear and social spaces maintained through the arrangement of people" (Griffiths and Quick, 2005, p.455).[88]

Additionally, bar-space seems to ecologically function in a socially fractal manner (unlike that of a local pub or third place; Oldenburg, 1999, et al.), the cohesion lies at individual and small-group level. Therefore, the bar-space is viewed as a spatial ecology, rather than in parts, but the observed phenomena involves different processes occurring in part-related synchrony.

[88] Griffiths and Quick (2005), add that "the space formed by groups for their social interactions are maximally convex and information-rich. [Linear] spaces in between mean it is straightforward to leave the group" (Griffiths and Quick, 2005, p.455); group convex spaces are info-rich and linearity (cf. choice routes) are directional between destinations.

3.3 Seat Occupancy

Banq, Seats Descending	Occupancy (July+August)
Seat B14	144
Seat S02	141
Seat 21	133
Seat 15	127
Seat 16	125
Seat 22	122
Seat 32	118
Seat 20	116
Seat 19	112
Seat 17	109
Seat 23	109
Seat 18	108
Seat 14	105
Seat 13	100
Seat 31	99
Seat 33	95
Seat 34	95
Seat 24	93
Seat 36	92
Seat 37	82
Seat 38	73
Seat 35	70
Seat 30	66
Seat 29	51
Seat 39	49
Seat 40	28
Seat B31	7

Key:

Table BT2
Table BT3
Table BT4
Table BT5
Table BT6
Table BT7

Fig 34. Sample of a table. from Appendix C.2: total occupancy of seats on Friday and Saturday nights in July.

Figure 34. highlights the seats that have been identified as being of particular interest in this study according to the same colour-groupings in the Intervisibility Totals Table (Fig 25.; Appendix C.). Again, high levels of intervisibility and areas highlighted in VGA analysis correspond to high levels of occupancy in the respective coloured bands (see Appendix X). Seat B14 showed the highest rate of occupancy overall, while sofa-seat S01 was the second highest, and highest of the sofa-seating. The most occupied banquette seat is situated at Table BT6, (coloured yellow); initial observation shows that seats on this table (along with table BT3) features high on occupancy tables, as well as previously in inter-visibility and VGA analysis.

When grouped according to *tables*[89], the aggregate seat occupancy of Table BT3 (Seats 15, 16, 31, 32) at 469 stands out, [90] with BT6 at 410. Taking a hypothetical average occupancy of a seat at these tables and comparing them with the low-bench and sofa seating, the average occupancy (derived from dividing the total occupancy of the seating-area by the number of seats) of BT3 is over twice the frequency of the low-bench area[91] and considerably more than the sofa-seating. Therefore, even though individual bench and sofa seats (B14, S02) feature high-up on the occupancy scale, as an seating-type/zone, the long banquette at the bottom of the plan is occupied more often.

[89] The banquette seating area can be compared as individual tables as space around the tables are relatively fixed and even though bigger groups sit at the tables, they move the seats but leave the tables separated, leaving table-seat arrangements at 4 seats to table relatively constant.

[90] Aggregate occupancy according to banquette table: BT2 (Seat 13, 14, 29, 30) = 322; BT3 (Seat 15, 16, 31, 32) = 469; BT4 (Seat 17, 18, 33, 34) = 407; BT5 (Seat 19, 20, 35, 36) = 390; BT6 (Seat 21, 22, 37, 38) = 410; BT7 (Seat 23, 24, 39, 40) = 279.

[91] The averaged seat occupancy of Table BT6 is just under twice the frequency at 102.5. (Averaged BT3 seat occupancy is 117.5). The low-bench area's average seat occupancy is 55.41 and the average occupancy of sofa seating is 79.2.

3.4 Snapshots

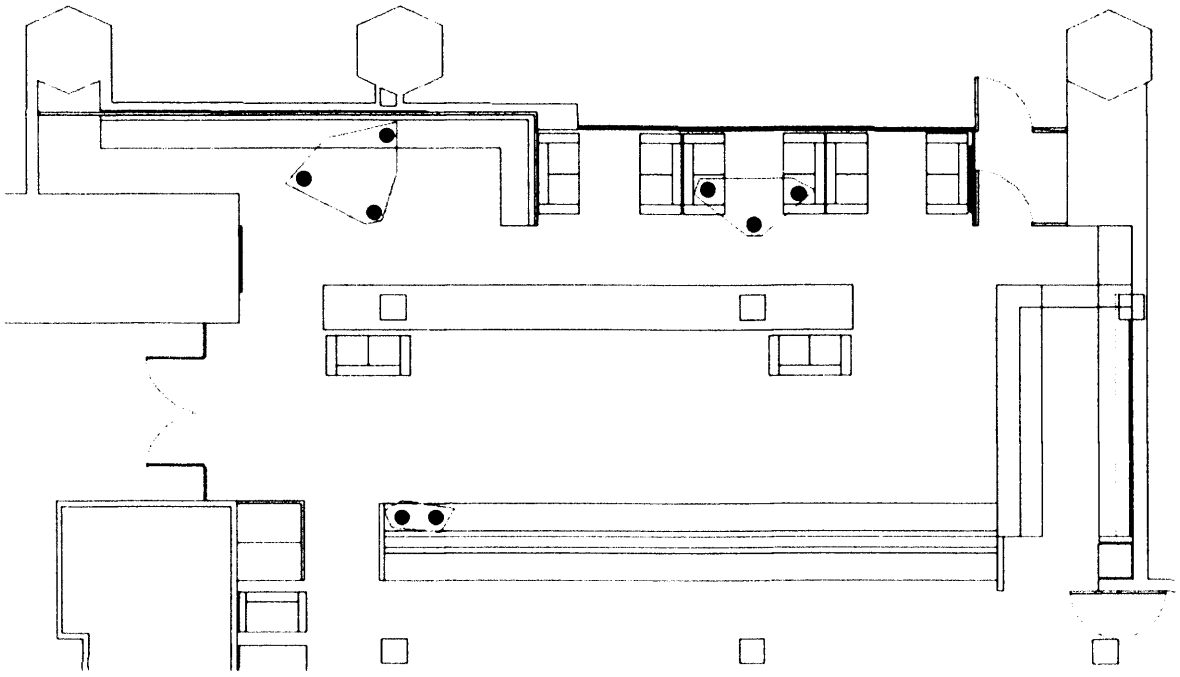


Fig35. Example of a snapshot diagram transposing data from video footage and the occupancy matrix, 10pm; Friday, 13th July 2007.

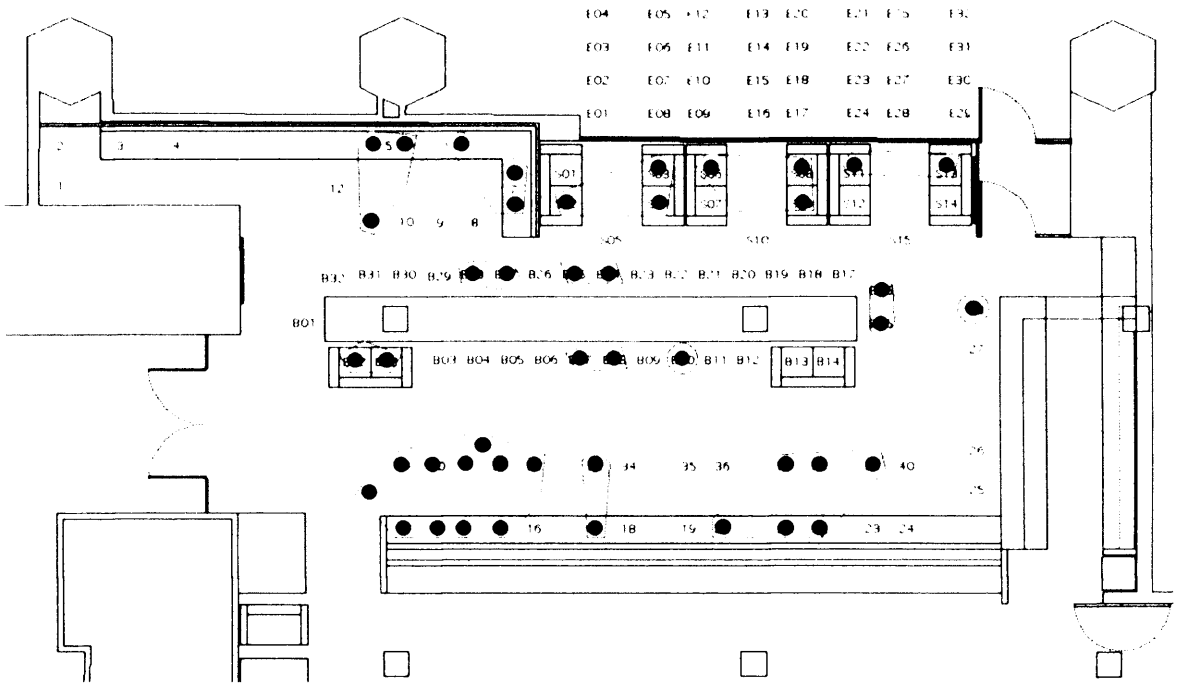


Fig 36. Example of a snapshot diagram transposing data from video footage and the occupancy matrix, 2am, Friday, 20th July, 2007.

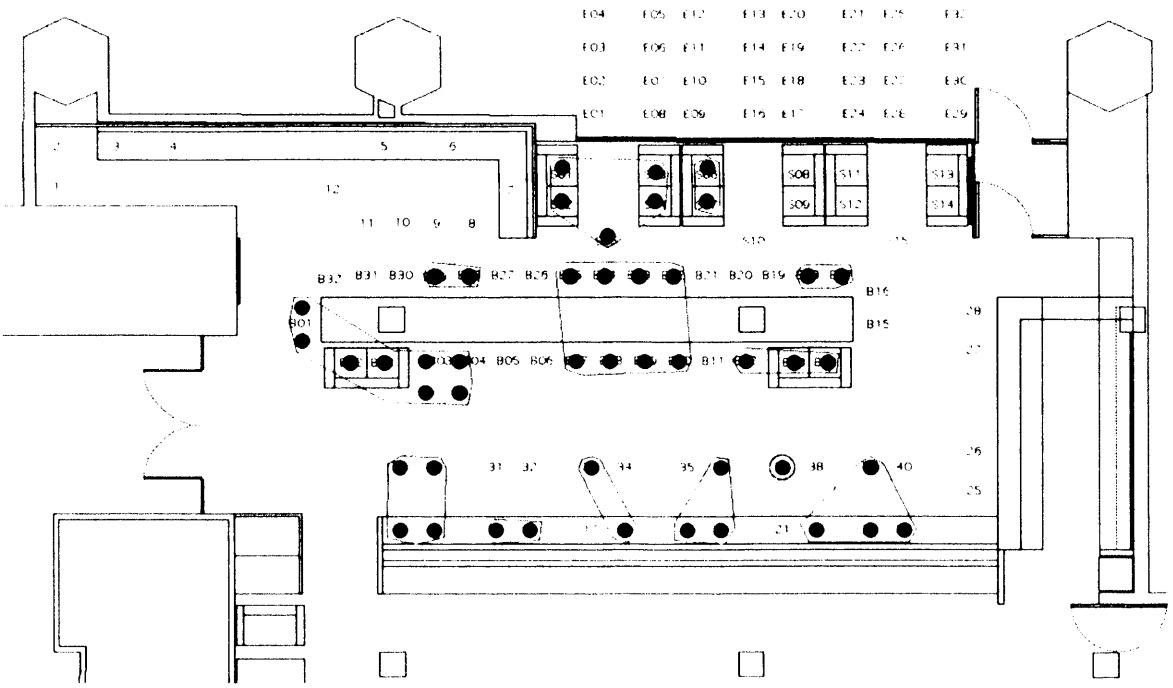


Fig 37. Example of a snapshot diagram transposing data from video footage and the occupancy matrix, 1am, Saturday, 28th July 2007.

The *snapshots* show similar findings to the video footage described in previous sections with greater clarity; they were recorded at one-hour intervals during the observations period on-site and against the recorded footage. From the diagram, the position and group affiliation of each individual is noted and group sizes can be differentiated from individuals to 2-person, to more-than-5-person groups.

3.5 Snapshot group-diagrams

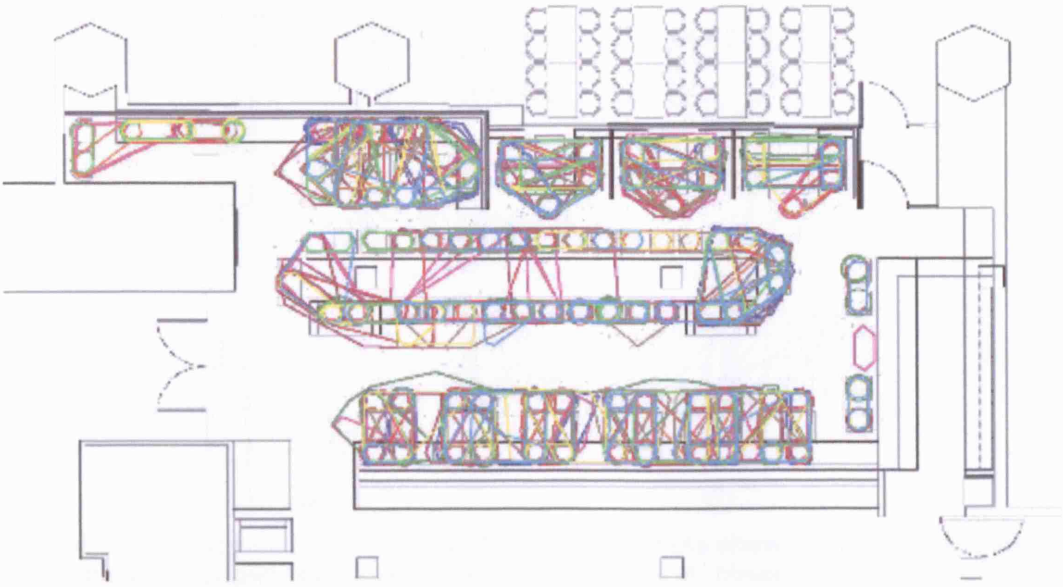


Fig 38. Line diagram of overlaid abstracted observation snapshots showing all seat occupancy at weekends, over the 2-month observation period. Outlines of the same colour represent groupings recorded during the same observation period.

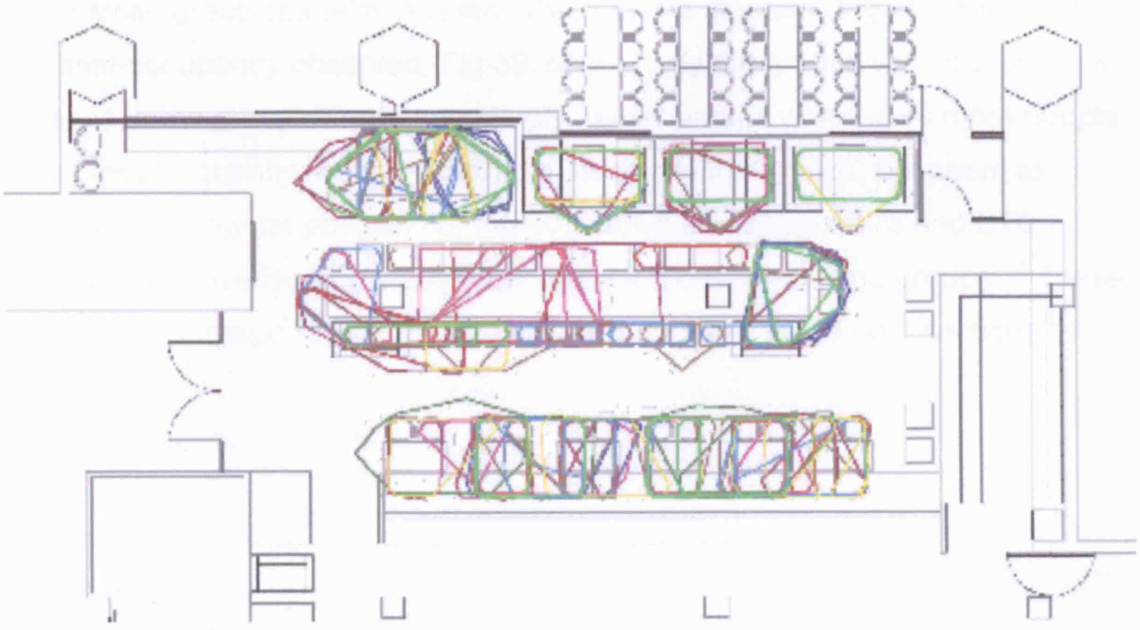


Fig 39. Line diagram of overlaid abstracted observation snapshots showing 4-or-more larger group seat occupancy at weekends, over the 2-month observation period. Outlines of the same colour represent groupings recorded during the same observation period.

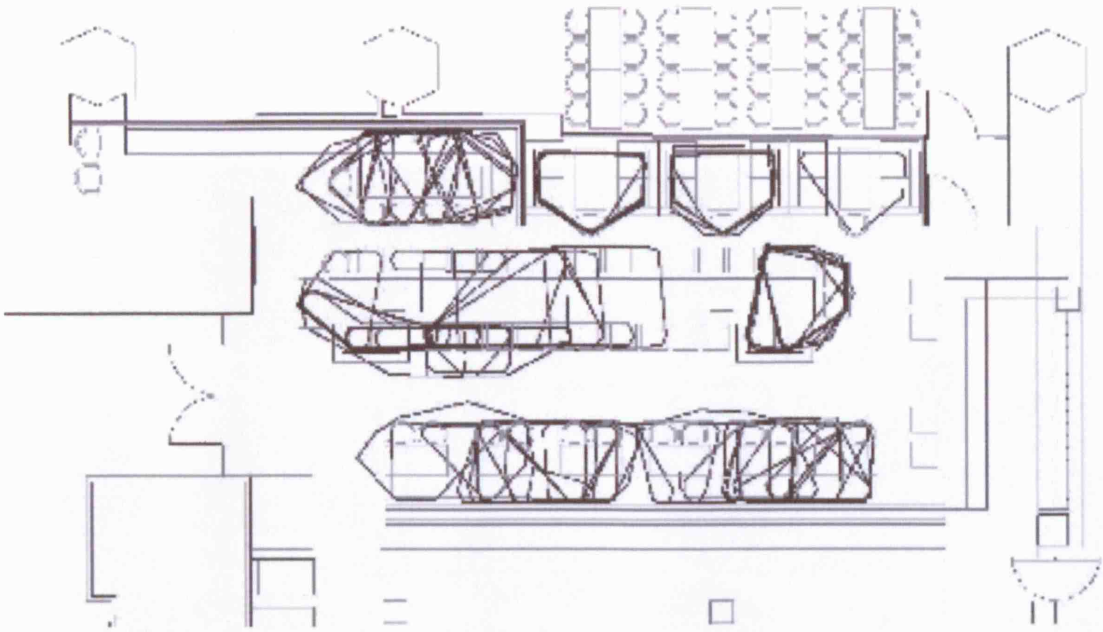


Fig 40. Line diagram of overlaid abstracted snapshots showing five-or-more-person-group seat occupancy at weekends, over the 2-month observation period.

Line diagrams abstracted from snapshots transcription of observation footage show small-group spatiality on plan. The first line diagram (Fig 38.) shows all the seat-occupancy observed; Fig 39. shows only the groups with four or more persons in the group. More interestingly, larger groups with five or more people occur less frequently than, for example, three-person groups, but seem to display more regular positioning; Fig 40. shows that Tables BT3 and BT6 feature in the overlapping intersection between observed large groups.[92] These areas also correspond with VGA analyses (described in the next section).[93]

[92] While line boundaries that are similar may imply the same group, different seated configurations suggest different groups (even taking into account that the same group might morph over time).

[93] Interestingly, on the low-bench seating, Seat B04 and B05 seem to be popular seats within large groups. One explanation might be its adjacency to both an anchored column and large seating capacity to their right.

4. Combined Analysis

4.1. Overlays

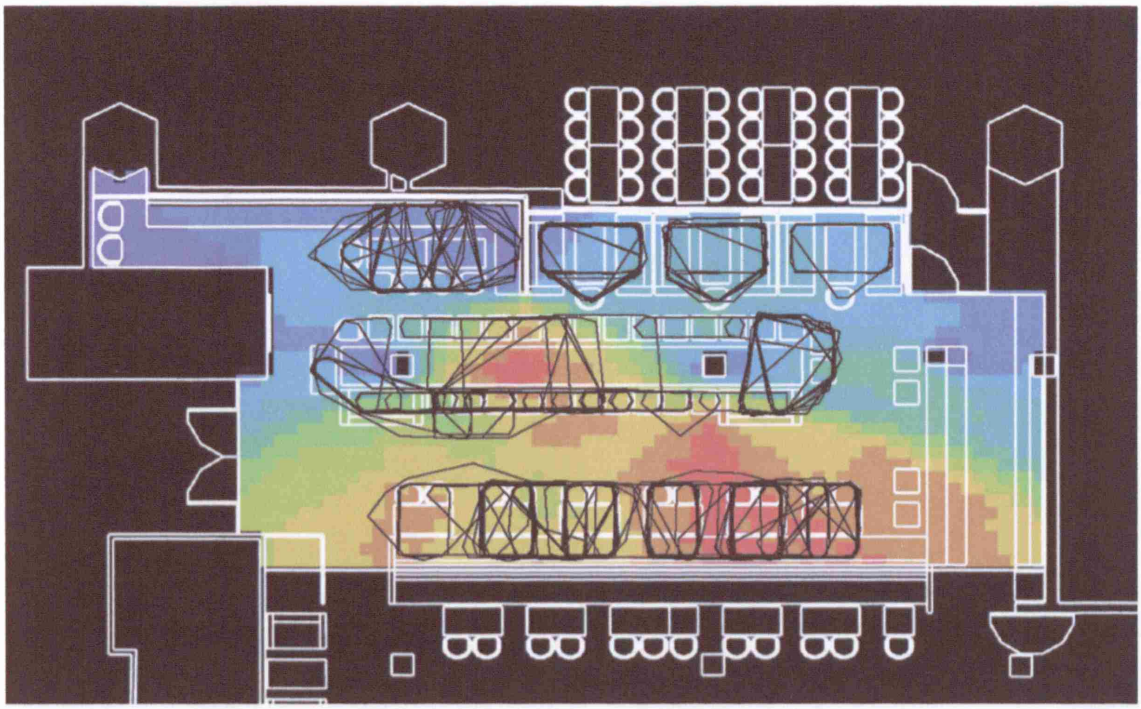


Fig 41. More-than-4-persons snapshot groupings and VGA IntegrationHH in the interior bar-space system.

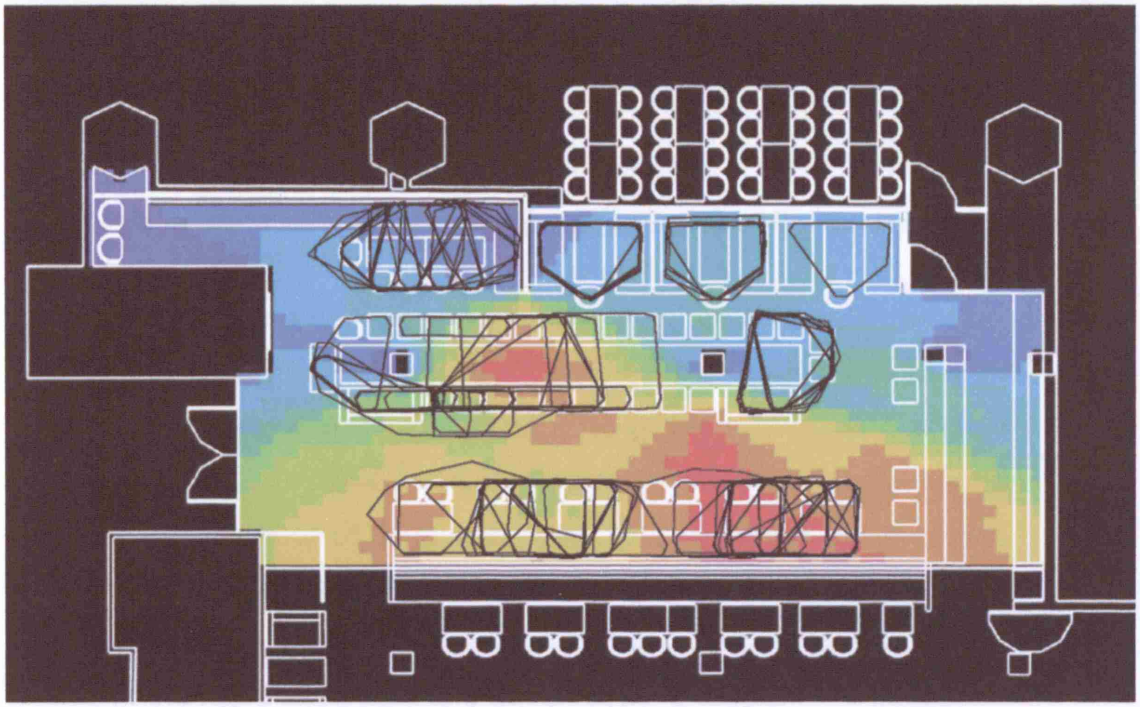


Fig 42. More-than-5-persons snapshot groupings and VGA IntegrationHH in the interior bar-space system.

Superimposing the group outlines (more-than-4-person groups, Fig 39.; more-then-5-person groups, Fig 40.) derived from the July and August snapshots, over the *IntegrationHH* VGA (Fig 21.2.), the resulting image (Fig 41.) draws a graphic relationship between the visual model and occupancy. Although there are no conclusive results, there seems to be a concentration of large groupings in the bottom-right corner of both images (Fig 41. and Fig 42.) that corresponds to the concentration of "redness" in the *integrationHH* graph.

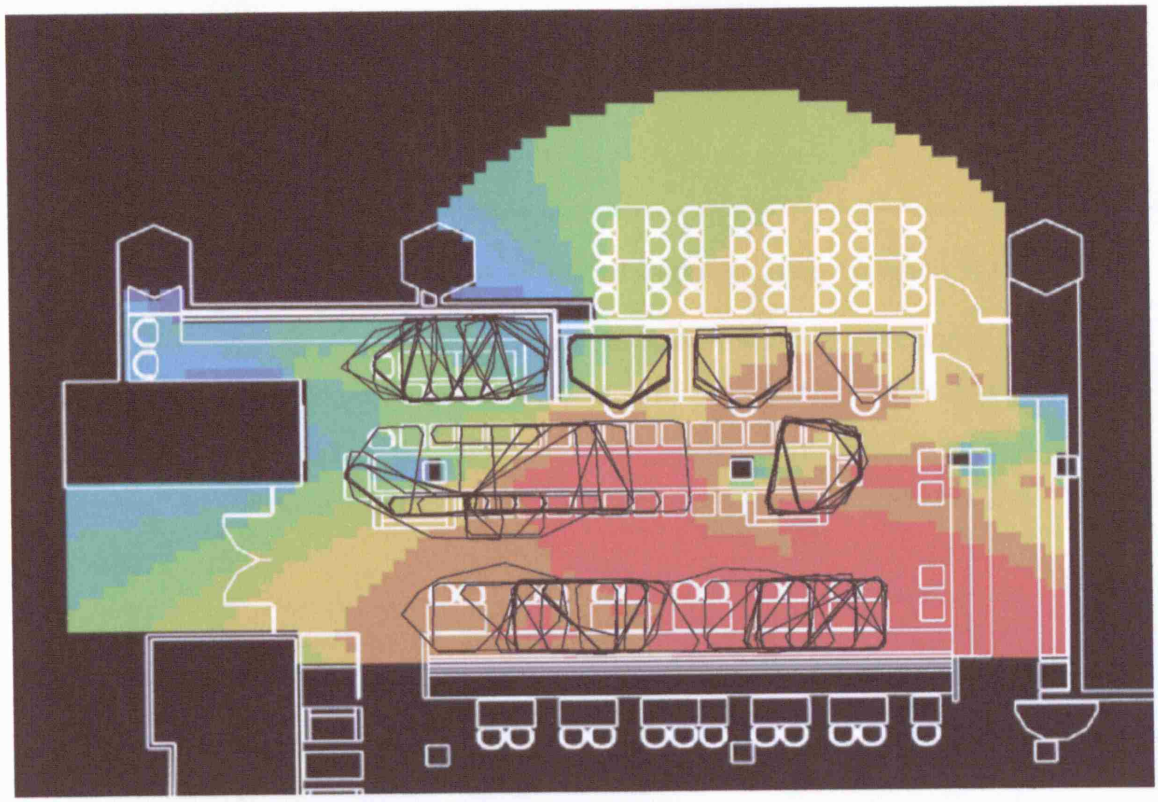


Fig 43. More-than-5-persons snapshot groupings and VGA Control measure in the bar space and exterior system.

With *more-than-5-person* grouping overlaid onto VGA Control, the graphic overlap is less conclusive; however, Figure 43. highlights the bottom left-hand corner of the layout and the low bench area as high control and occupancy zones; Table BT6 (identified earlier) also seems to feature in the overlaps between larger groups of people, as does Table BT3 to a lesser extent. However, the VGA analysis seems to correspond with the banquette seating arrangement along the bottom partition and does not explain occupancy of groups in the more fixed sofa and bench seating areas.

4.2. Scattergrams

Scattergrams correlating VGA values to occupancy rates (Fig 45.- 49.) reveal the measure that most reflects real-life behaviour and positioning. In addition, different ways of calculating adjacency between seating positions are correlated to seat occupancy to determine whether adjacency values of full visibility or full and partial visibility most reflects seat occupancy (Fig 50.- 53.).

Correlations

	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.061	0.194	-0.373	0.067	0.136	0.149	0.209	0.084	0.155

Fig 44. Table of correlated values for all seated positions. (See Appendix A.)

VGA measures - *visual connectivity*, *visual integration*, *visual control* and *visual controllability*, seem to show low correlations to occupancy. Further translation of the correlated values (Fig 44.) highlights "Visual Integration" and "Full Adjacency" as being the highest correlations with seat occupancy of the measures tested.[94]

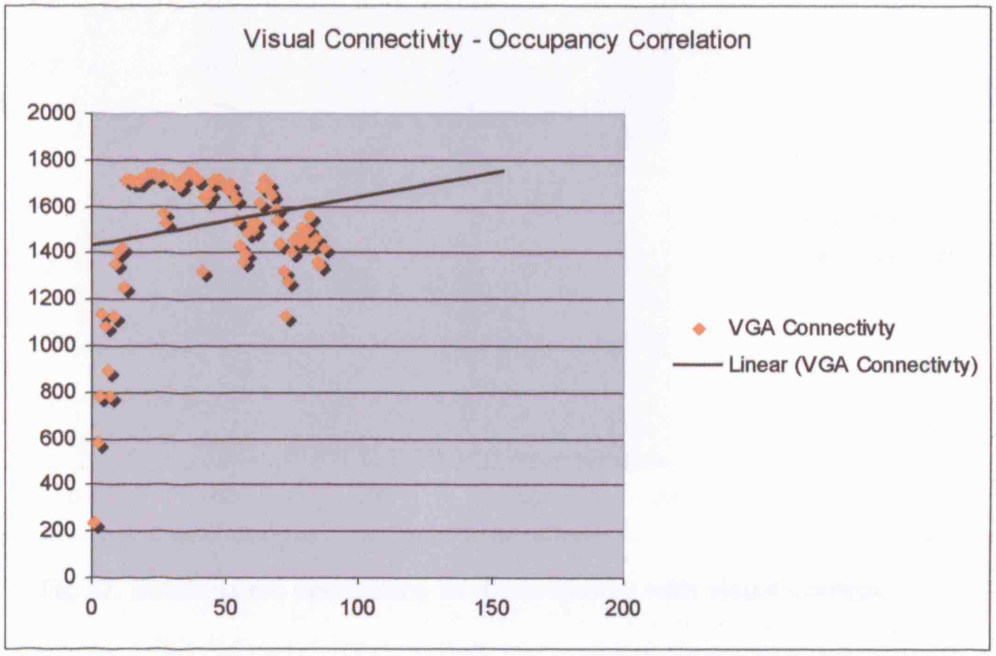


Fig 45. Scattergram correlating seat occupancy with visual connectivity.

[94] See Appendix A. for full combined table showing seat code, isovist area, VGA measure values and Adjacency.

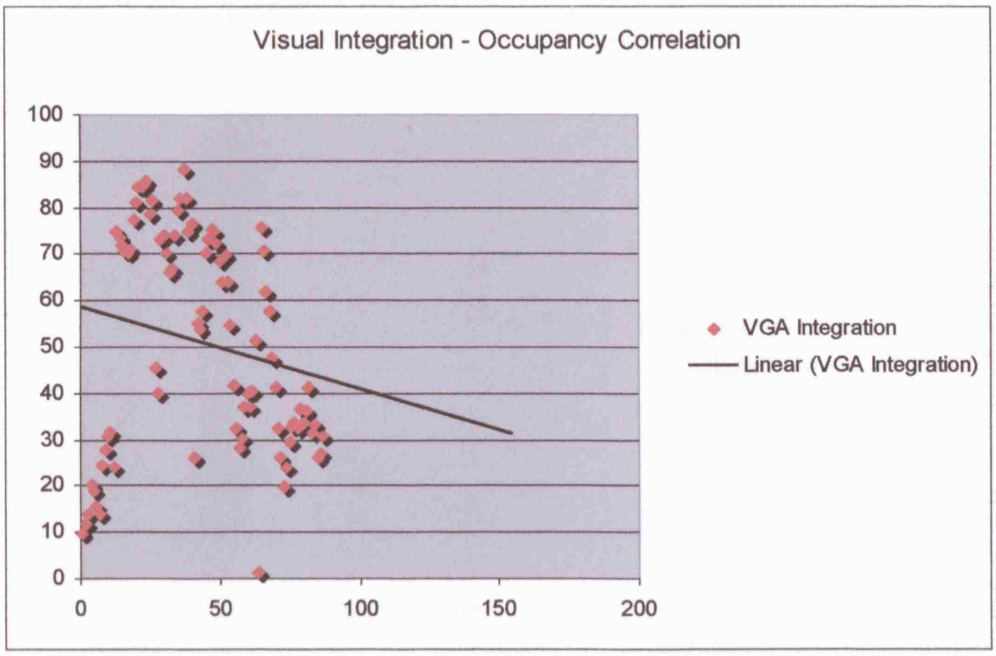


Fig 46. Scattergram correlating seat occupancy with visual integration.

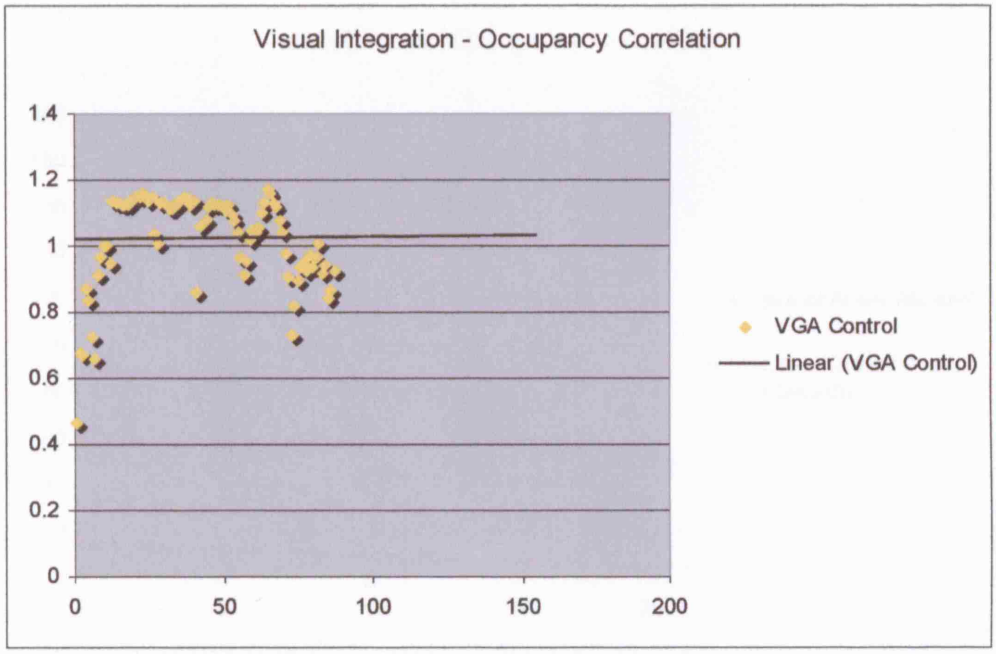


Fig 47. Scattergram correlating seat occupancy with visual control.

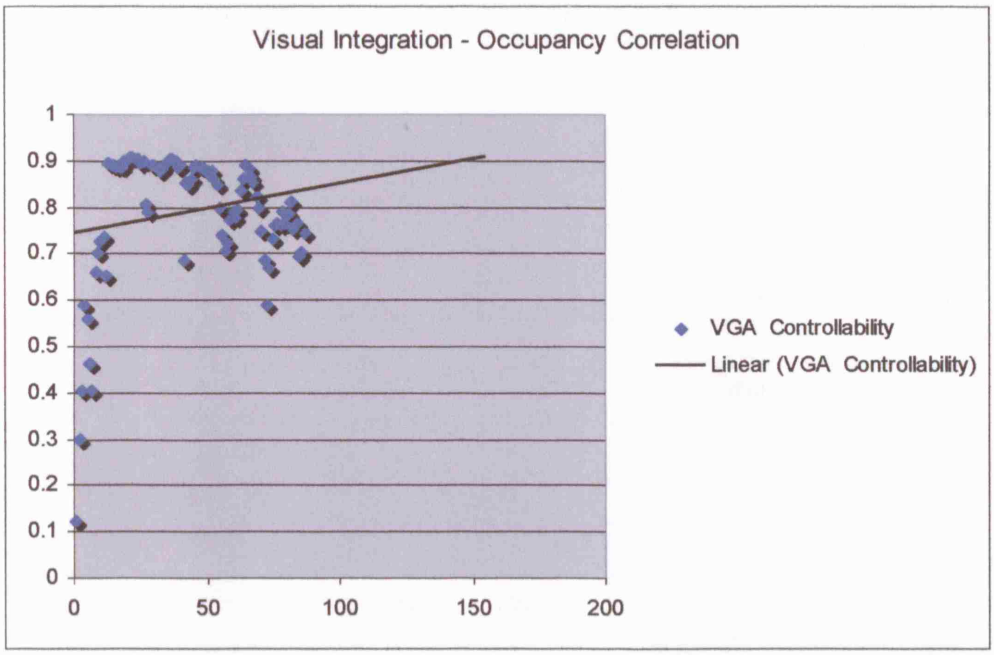


Fig 48. Scattergram correlating seat occupancy with visual controllability.

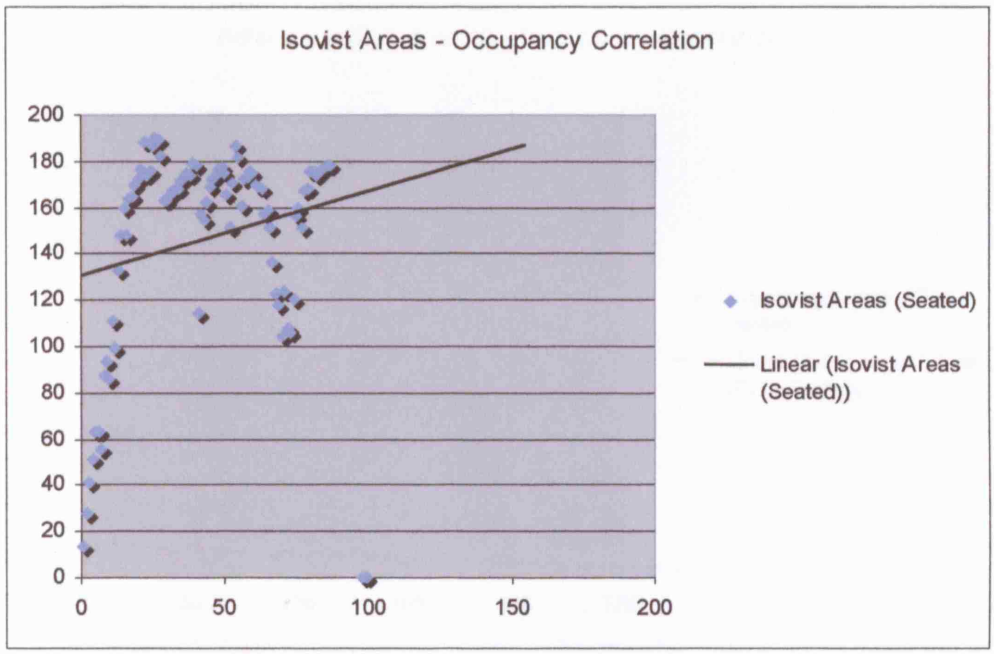


Fig 49. Scattergram correlating seat occupancy with Isovist area.

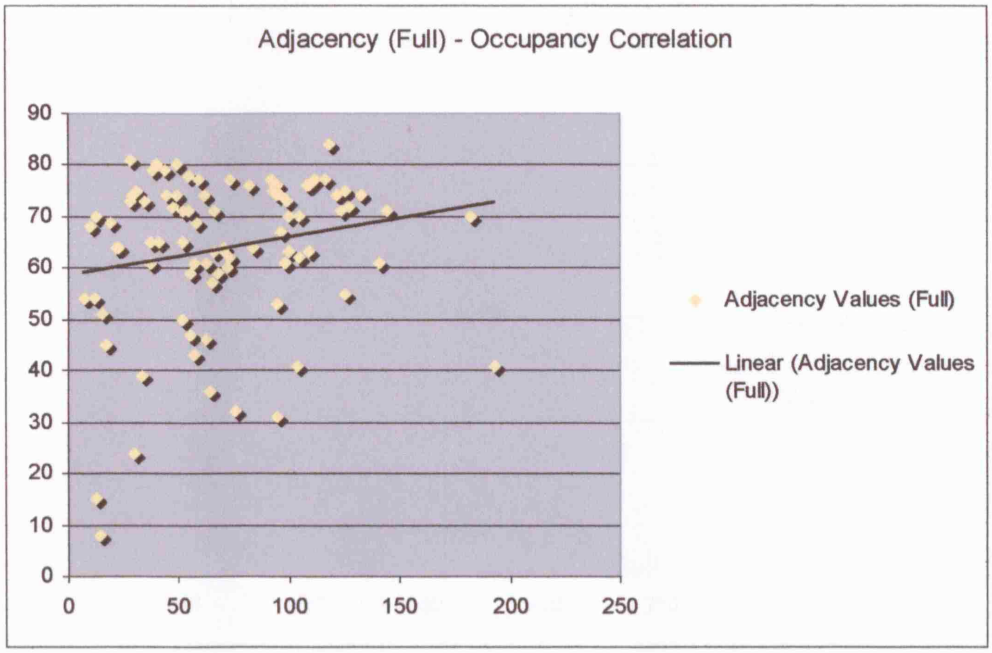


Fig 50. Scattergram correlating seat occupancy with full adjacency.

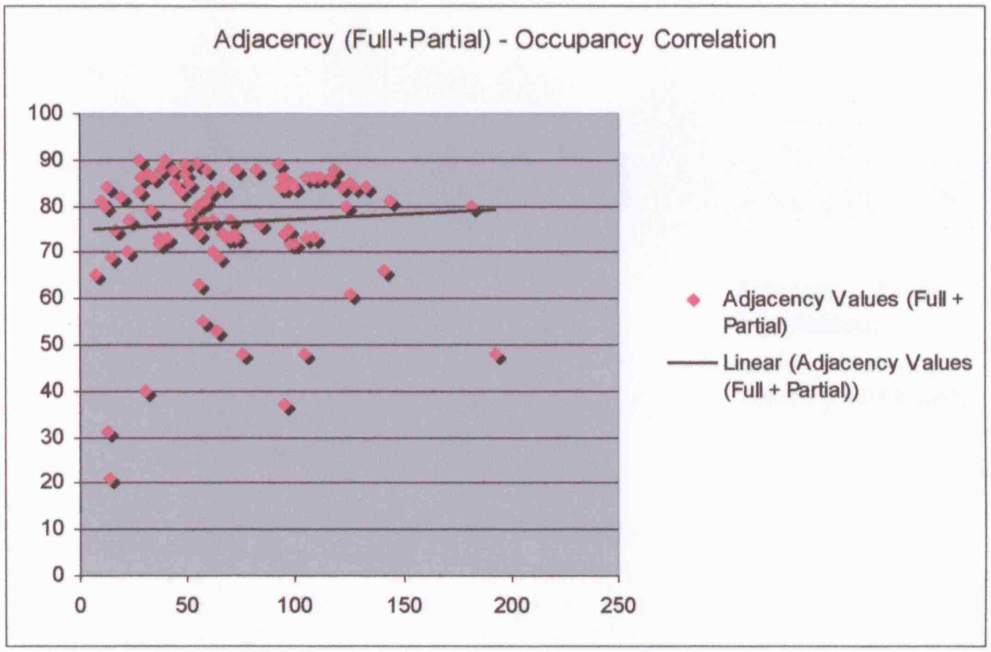


Fig 51. Scattergram correlating seat occupancy with full and partial adjacency.

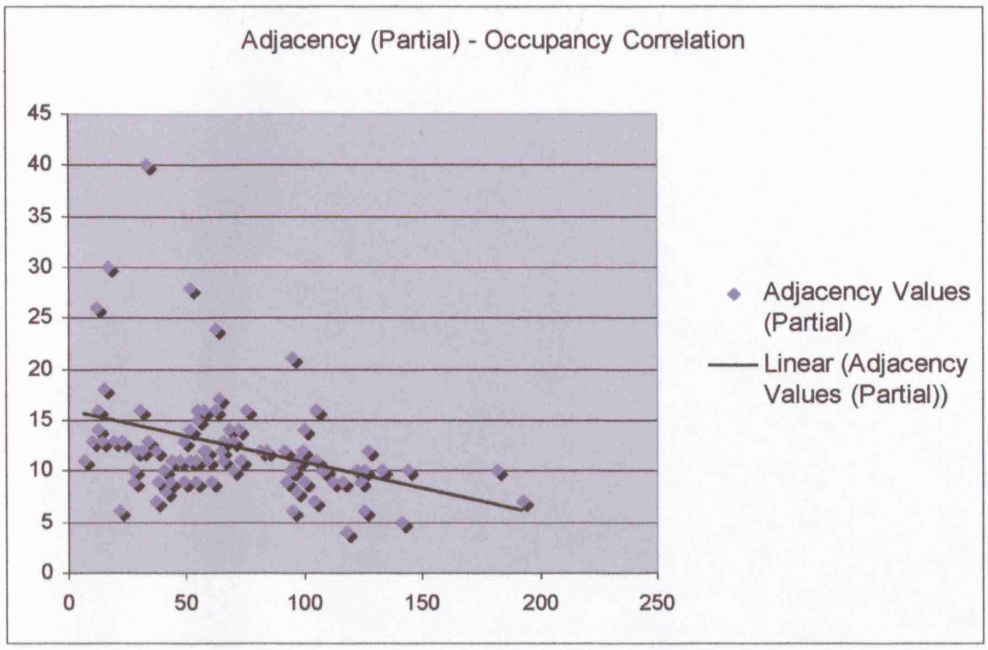


Fig 52. Scattergram correlating seat occupancy with partial adjacency.

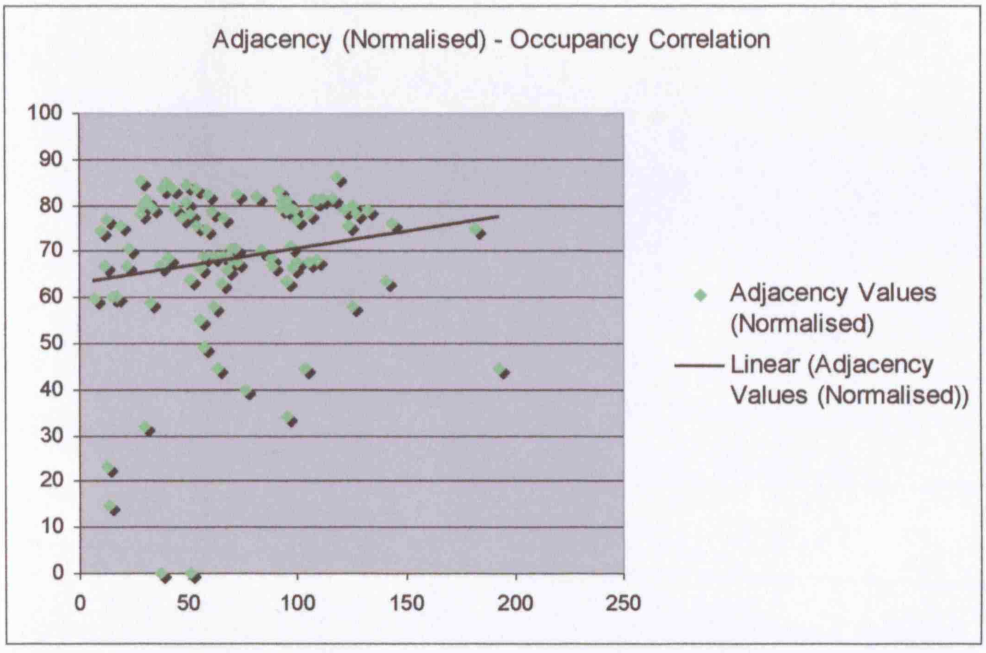


Fig 53. Scattergram correlating seat occupancy with normalised adjacency.

As a visual system, there seems to be unpromising results in visual-occupancy correlations (only a slight correlation with integration). Admittedly, the correlated VGA values of visual connectivity, integration, control and controllability, have been taken from only one of the four VGA models constructed (as this particular graphic model showed the most interesting initial results) and it would be beneficial to correlate the other models with occupancy for further investigation.

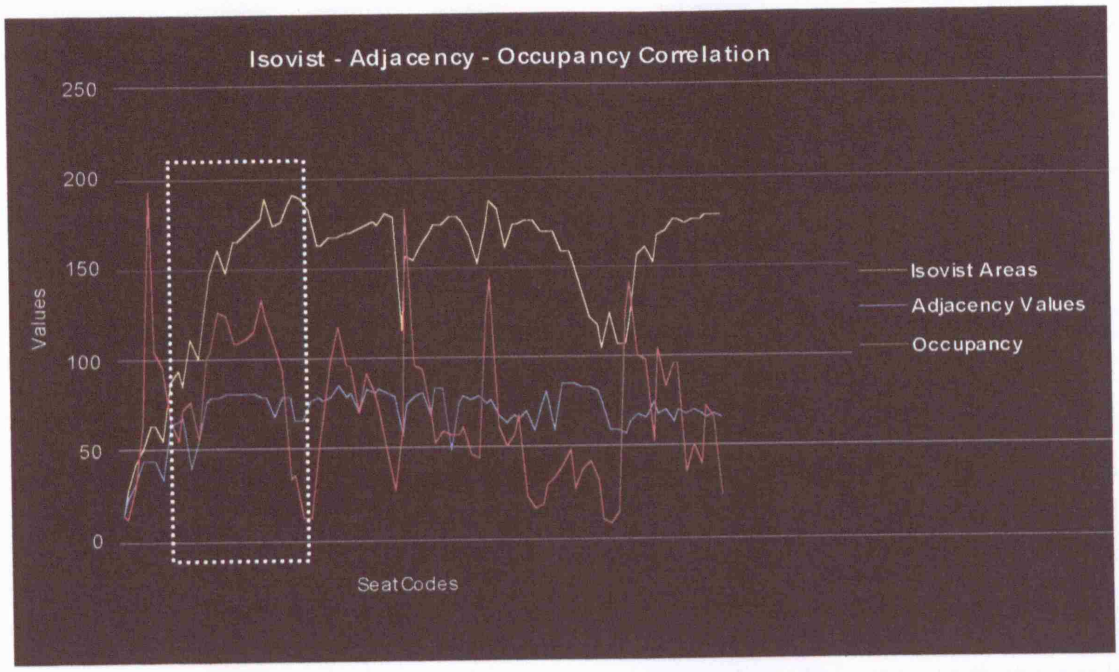


Fig 54. Line Chart correlating seat occupancy with Adjacency and Isovist Area. The white dotted outline indicates values for the banquette seating area along the bottom of the layout.

Interestingly, when isovist area, adjacency values and occupancy are plotted in a progression, the adjacency line-graph above (Fig X.) seems to echo the occupancy progression more than the isovist area line-graph, especially in the first section of the chart representing the banquette seating area.

Therefore, focusing on banquette table-seating area, the line chart might be picking up a correlation between adjacency and occupancy for this type of seating that does not account for the entire system. Already it has been suggested that there is a correlation between the high adjacency values and occupancy of seats positioned at Table BT3 and BT6. The banquette-correlation table below demonstrates adjacency values of the banquette seating increases dramatically against the isovist areas when the different data separated into distinct spatial and seating types.[95]

Banquette Correlations	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.146	0.359	-0.626	0.246	0.305	0.308	0.287	0.299	0.311

Fig 55. Table of correlated values for banquette seating only.
(Refer to Appendix A. for full table.)

Comparing the values in Fig 55. to those below of Fig 56.- 57., this paper suggests that the banquette seating-type is thus more dependent on inter-visibility between possible seating positions rather than isovist areas, whereas, the low-bench seating in the middle of the space is governed by its isovist areas and higher visual connectivity to the rest of the space because of its central location. Interestingly, the banquette seating has a higher controllability correlation with occupancy than the low-bench seating. This means that people are still sitting in banquette seats that have high controllability values more than in the low-bench seating (where the hypothesis holds that people would avoid seats where they feel visually vulnerable). Perhaps, the adjacency/inter-visibility and integration values of the banquette seats (that have a higher correlated to occupancy) override the high controllability of the seating type and position.

[95] As expected, partial adjacency does not bear any significant correlation.

Low Bench Correlations	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.353	0.179	-0.252	0.051	0.134	0.272	0.259	0.096	0.282

Fig 56. Combined table of correlated values for low bench seating only.
(Refer to Appendix A. for the full table.)

Sofa Seating Correlations	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.026	-0.139	-0.271	-0.434	-0.286	-0.500	-0.318	-0.615	-0.484

Fig 57. Combined table of correlated values for sofa seating only.
(Refer to Appendix A. for the full table.)

Also, the sofa seating-type seems to have a negative or no correlation to the visibility models; yet, they still retain their relative popularity. It is undecided whether the choice of seats in this area is based on the preference for privacy in particular situations (implied by lower visibility values)[96] or that seat-choice for sofa-seating is more dependent on the perceived comfort of a sofa-seat to that of a banquette seat or low-bench stool, rather than on visual properties of the area.

Overall, the scattergrams and correlation-values measuring the degree of compatibility of visual models as determinants of seat choice, suggest three zones in the bar-space that work slightly differently. It may be said that the differing seat types (banquette, low-bench and sofa-seating) have been positioned spatially in zones so that each visual zone has a distinct furniture treatment that reflects its visibility properties (or perhaps lack of).

[96] Refer to Appendix A. for full table of visibility values for each seat-type.

For example, the "cosier" sofa seating is positioned in a less visually integrated area than the banquette seating even though it would have been equally possible to place the sofa seating where the banquette seating is and vice versa. The central low bench is a linear fixed furniture-feature; this inflexibility, coupled with high controllability and low control values makes it less attractive than the banquette seating. Even though the banquettes have high controllability values, its inter-visibility, integration and control values outweigh visual vulnerability. In a way, the banquettes partly reflect the nature of a bar (as described earlier as one of inherent sociability) where there is visual exchange from seat-positions – where it is possible to be in mutually visually controlling and controllable positions; in other words, "to see, and be seen" at the same time.

In the next section, the bar-space is used to test the alteration of furniture orientation and mixing of seating-types in previously homogenous furniture-zones; the new layout is subjected to similar spatial and observation investigations as the original layout (to a limited extent).

5. Layout experiment

5.1. New layout

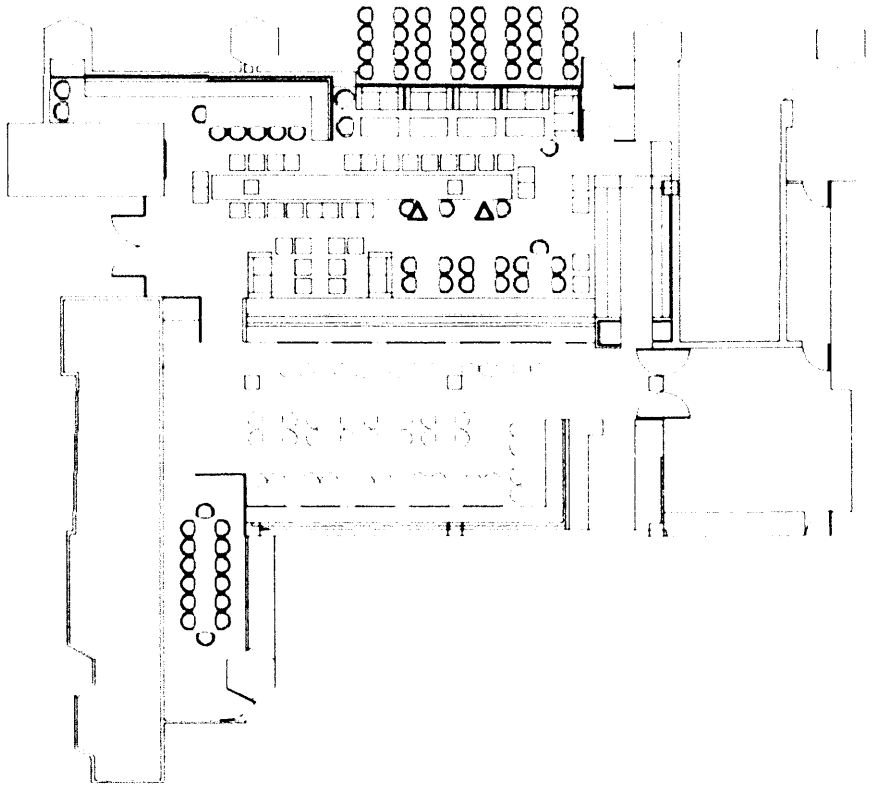


Fig 58. Plan of new layout.

An experiment was conducted to test different seat configurations; architectural structures and fixed-furniture were un-movable and remained the same. The movable furniture configuration was altered so that where there was linear banquette seating before, clusters of lounge-like mixed sofa and stool seating was introduced (Fig 58.). In the new layout, the linear visual configuration becomes groupings of convex-like spaces and there are far fewer seats with their backs to the middle of the room.

Dividing that area into sofa/stool seating and table-and-chair seating (in a slightly different orientation to the linear banquettes before), it is possible to test two conditions at the same time: lounge-like and dining-like; this new orientation of "fatter" (as opposed to linear) areas form along the anchored banquette partition (Fig 58.). Individual tables (seating 1-2 people) are set up against the

low-bench (marked Δ); the small number of individual tables (two) and the height discrepancy draws attention to them and it is expected that these will not be popular seat-choices.

The area that overlooks the street remains a "sofa area"; however, the sofas have been oriented to face inwards towards the middle of the bar-space and away from the street, making them more open to the rest of the space than they were before (in a face-to-face orientation).

Fig 59. Views of the bar showing the change in furniture layout and furniture type.

Overall, attention was paid to the areas on the periphery of the rather than using the low-bench as the focus of the room; the entire bar-space has been given a "fatter" convex approach rather than its previous linear furniture layout. The edges of the bar now seem more robust and the middle seems more spacious.

5.2. New layout Visibility Graph Analysis

The new furniture layout is superimposed onto the same VGA model as in Figure 21.1. – 21.4.; even with the new furniture layout, the visual field at eye-level remains similar.

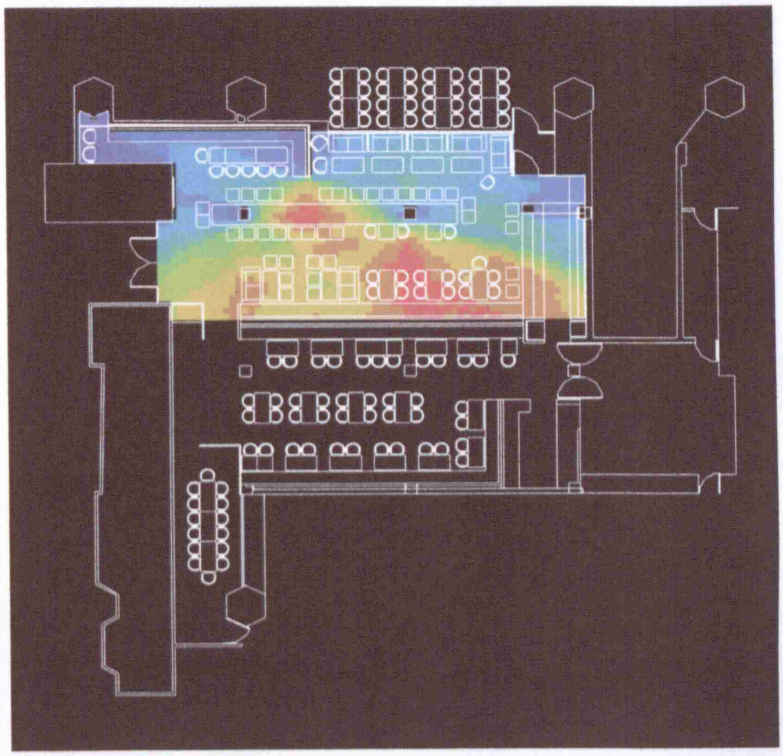


Fig 60. Visual IntegrationHH measure of the bar-space with the new furniture layout.

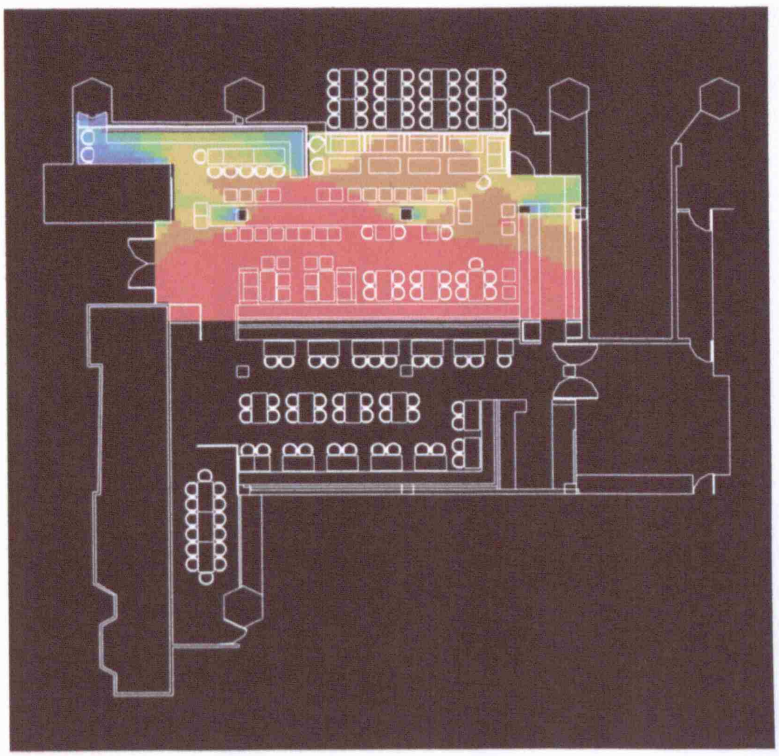


Fig 61. Visual Connectivity measure of new furniture layout.

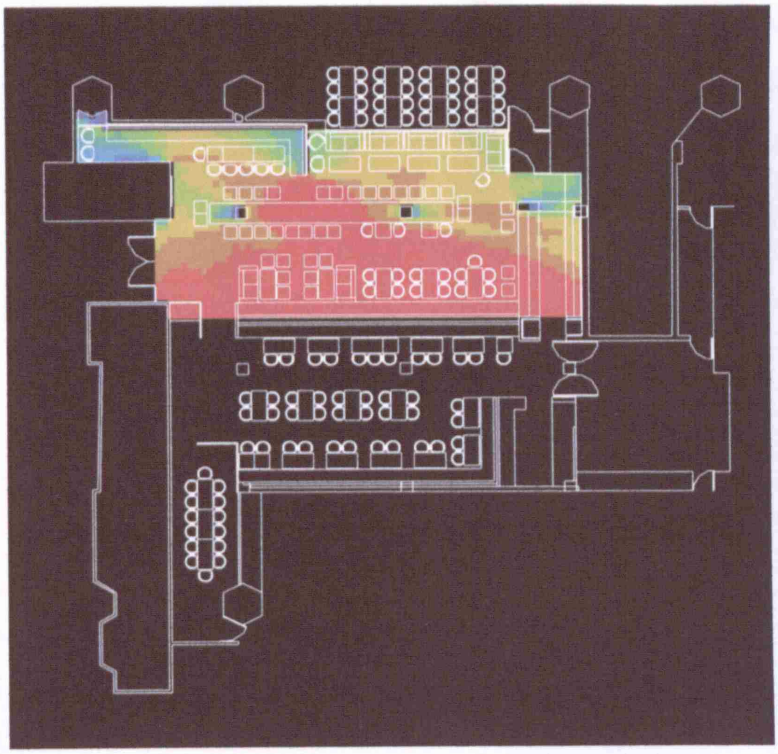


Fig 62. Visual Control measure of new furniture layout.

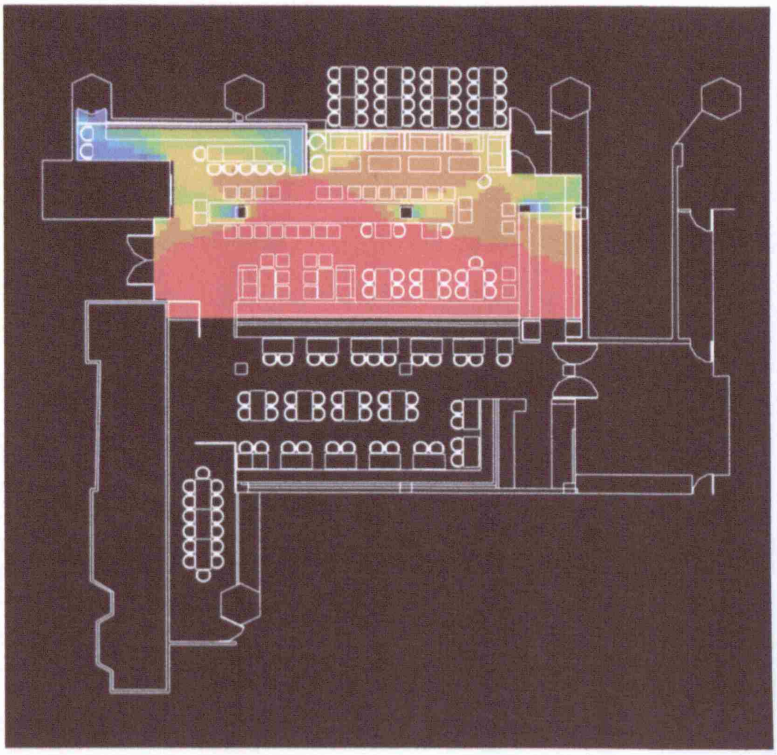


Fig 63. Visual Controllability measure of new furniture layout.

If the hypothesis behind the VGAs holds true, people will still situate themselves in the same positions as in the original layout, especially on the lower partition, where the linear banquette seating used to be. [97]

[97] It would be interesting to further construct an adjacency graph to support VGA analysis.

5.3. New layout Projection Polygon Analysis

The visibility properties shown in the VGA analysis of the space remains identical to the original layout as the features of the space at eye-level remain the same. However, the movable furniture layout has been altered and consequently, Projection Polygon Analyses yield new results.

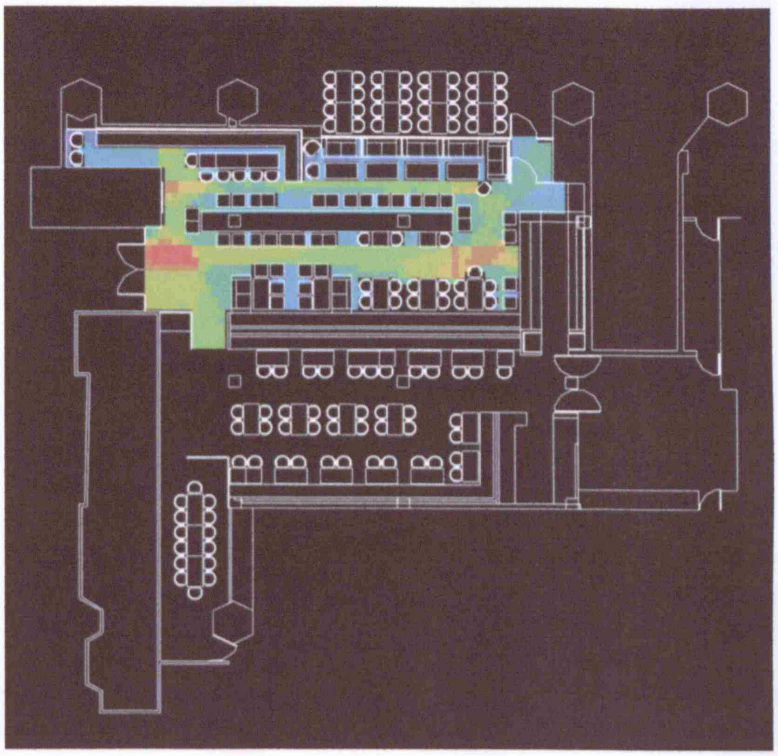


Fig 64. Projection Polygon IntegrationHH measure of new furniture layout.

Comparing the VGA of the new and original layouts, the integrationHH measure (Fig X.) shows more greenish-yellow intermediate colours (turquoise, light blue) than dark blue areas, suggesting a more spatially integrated system (possibly due to the freeing of space by the sofa area); the visual properties of the space as a system lightens up and initial graphic comparison between this graph and the projection polygon of the original layout (Fig 22.1. - 22.4) indicates higher integration values in the new system as a whole.

Additionally, the new configuration picks up a "ring" of integration that flows around the middle low-bench, creating a more distributed integration pattern that pushes integration away from the strong circulation corridor between the main entrance and the bar area found in the original projection polygon.

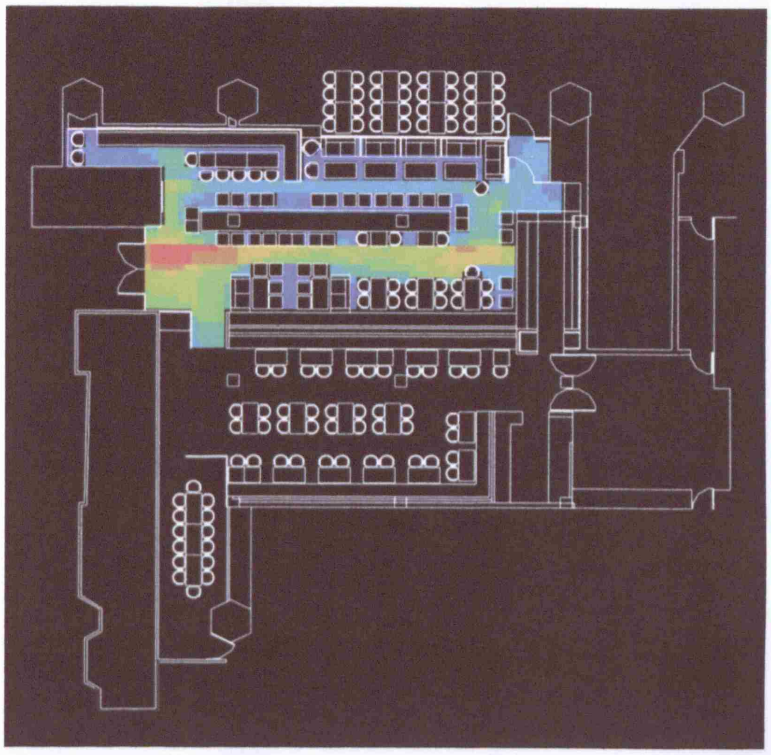


Fig 65. Projection Polygon Connectivity measure of new furniture layout.

Similarly, projected connectivity (Fig 65.) of the model lightens up from the original layout (Fig 22.1.), distributing the yellow colours to a wider area. With this measure, the movement corridor features slightly more prominently than in the integrationHH model and the "ring" of warm values is incomplete. Interestingly, connectivity is concentrated around the entrance area and "redness" in front of the bar in the original layout is diminished.

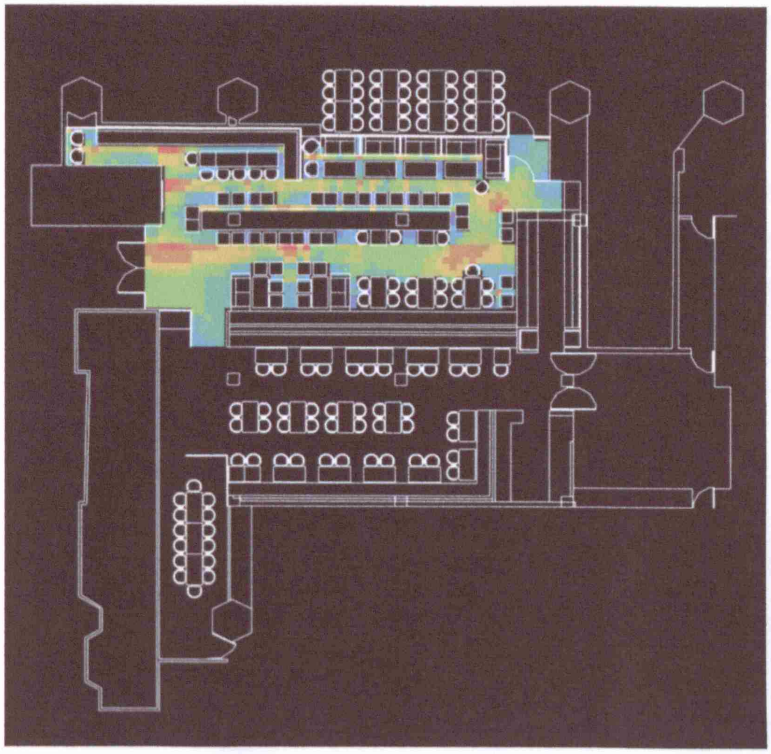


Fig 66. Projection Polygon Control measure of new furniture layout

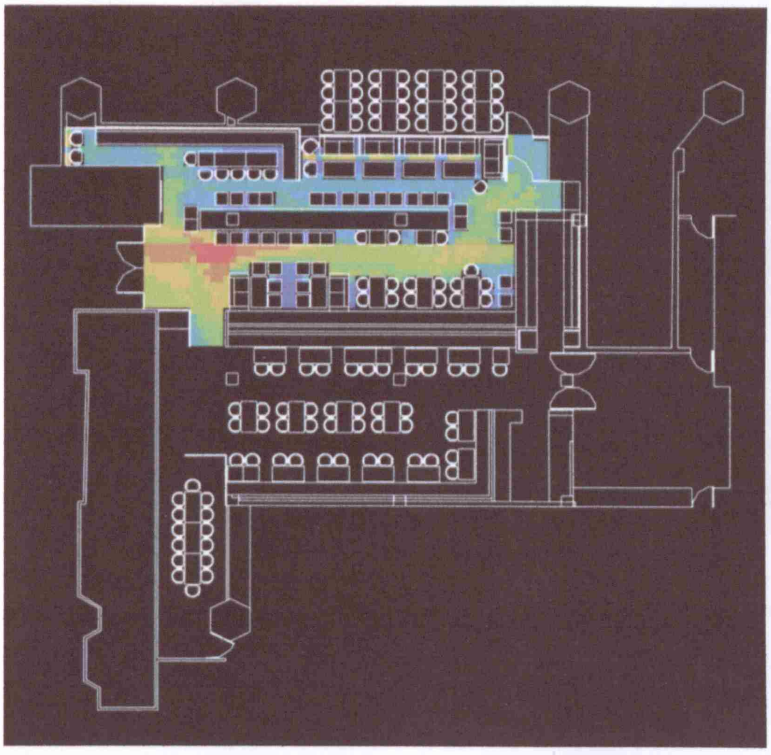


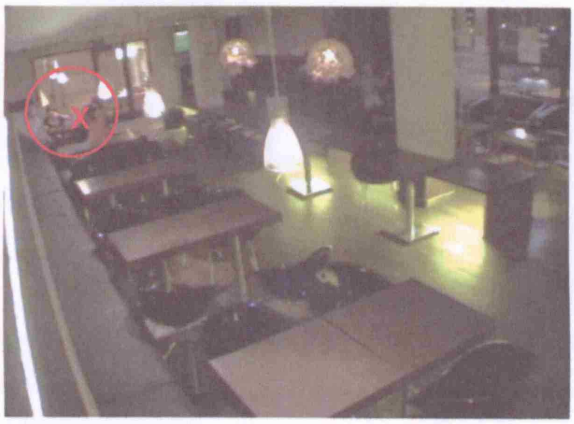
Fig 67. Projection Polygon Controllability measure of new furniture layout.

Interestingly, Projection Polygon *control* distributes "red" clusters that seem to be mostly "anchored" to corners of walls or fixed-furniture. Whereas the *controllability* measure seems to highlight a "yellow" path cutting through the space from the main hotel entrance to the street entrance that corresponds with movement flow and the same route plotted in the standing isovist section in Appendix B. This measure demonstrates graphically the feeling of visual vulnerability experienced along this path.

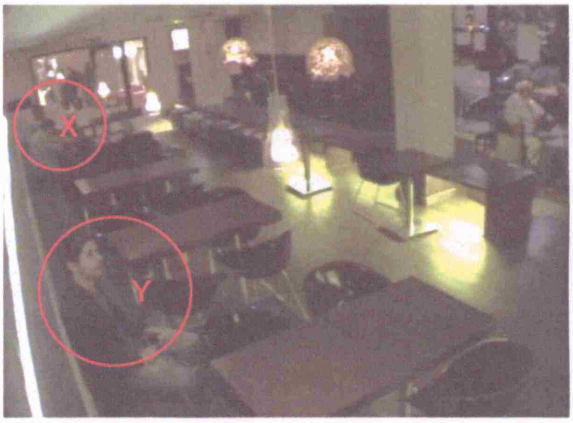
5.4. Observed behaviour and seat choice

Observed video footage recorded on 2 September 2007, indicates initial customer preference for the mixed sofa seating situated nearest the main entrance (as the image stills in Fig 68. demonstrate). The low-bench in the centre of the room is hardly utilised; surprisingly, the single tables and chair configurations incongruently located by the low bench that were expected to be unpopular were occasionally occupied.

9.00pm, 2 September, 2007.

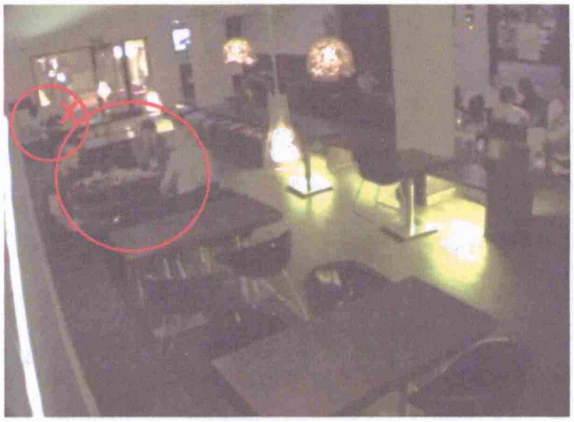


9.30pm, 2 September, 2007.



10.00pm, 2 September, 2007.

10.30pm, 2 September, 2007.



11.00pm, 2 September, 2007.

11.30pm, 2 September, 2007.

12.00pm, 2 September, 2007.

12.30pm, 2 September, 2007.

Fig 68. Image stills of occupancy in new furniture layout; 2 September, 2007. The red outlines indicate the position of groups of people in the space.

The images show that sofa seating (marked X) seems to be occupied most of the time; Table Y is occupied frequently. The recordings revealed the higher occupancy in the new sofa-seating is positioned in a zone of high control and integration concentration (shown in Fig 68.) previously occupied by popular tables BT2 and BT3; perhaps this loosely indicates that high occupancy, and therefore, seat choice consistently relates to reaction to the visual properties of the space.

The VGA models suggest that regardless of furniture configuration, visual fields at eye-level should still correspond with seated-position patterns. This seems to still hold true as linear banquettes (tables BT2-BT3) replaced by sofa seating in the new layout were both popular seat choices in areas of high control and integration values (regardless of furniture-type); at a glance, observations do not contradict VGA analyses; at the same time, observation from recording alone is inconclusive to demonstrate the relationship between visibility and occupancy-behaviour.

In addition, it was observed that during the week that followed the alternations, the sofas overlooking the street were returned to their original position and table-and-chair seating along the bottom banquette was replaced by additional sofa seating along the length of the partition. Interviews with the bar-staff revealed that customers preferred the new sofa layout, saying that the space looked more "lounge-like", and this differentiated it from a dining ("canteen") area. When asked whether customers liked the new layout because of the introduction of sofa seating-type or the new configuration, they answered it was both, but mainly the visual impact of the new arrangement.

Conversely, the increased popularity of the sofa seating (which now dominates seating-type in the space) had a negative effect on the low-bench area; bar-staff commented that customers always chose sofas over low-bench seating (which is rarely occupied). Also, the new layout accommodates larger groups of people, and individual customers have to share their (convex) "space" with strangers or sit in the unpopular low-bench area as there was more flexibility with the linear banquette tables.

The new layout proved to have a positive impact on revenue earned; the manager commented that people stayed for longer periods of time in the lounge seating and bought more than one drink during the course of their stay. This strongly implies that the layout changed behaviour: while previously the banquettes facilitated high turnover of 1-drink customers, the new layout encouraged longer staying customers who bought more drinks. It would be interesting to further this study into which customer-type spent more.

The single Sunday evening observation-period limits these findings while an extended observation-period similar to that undertaken with the original layout would be beneficial to further this inquiry in furniture-type and orientation of seated positions across strategic layout variations and to indicate an optimum seating configuration that utilises the different properties of visibility analysis as a basis to determine the most suitable type of furniture to promote inter-visibility (balanced against the preference for privacy), and in turn, sociability, while increasing revenue .

6. Conclusions

To summarise, this paper has adopted an ecological approach to the investigation of the small interior bar-site, in joining the established commentary on human behaviour, and particularly in relation to its environment. This study serves to draw attention to the properties of objective space, asserting that the spatiality of social activities that occur in these environments affect human choice and orientation.

Explaining behaviour in its own terms reproduces phenomena "in excurbated form" (Hillier and Leaman, 1973, p. 508), and to this end, discussing sociability and the resulting human behaviour in terms of the spatial properties in which it occurs proves a viable discursive basis to describe human behaviour and the man-(spatial) environment relationship.

Focusing on the visual affordance of space to its users, it follows logically that we perceive our environment-space mostly through sight, and therefore allows for a common basis to analysis human-space relationships. To this end, this report has found correlations between freely-chosen seating positions and visual integration and control within the visual ecology of the site. However, it is hypothesised that seat choice is not explained by increased visual ecology alone, but also persons in relation to other persons.; many factors influence behaviour and reduce it to In this report, a number of systems has been found to occur.

Particularly, the preference for seat-type and a balance to the visual field a seated position offers. In itself, the visibility implies notions of visual connectivity to others, yet being visually exposed to the same people. In discussing the visibility potentials of a seat-space, this paper has been able to objectively and ecologically predict the visibility affordances, separated from personal visual fields, and the cultural implications that a personal standpoint brings.

Briefly, the most interesting findings of this study is in the alteration of the bar-space layout; while the theoretical visibility models remained similar, the orientation and introduction of different furniture-types to areas previously analysed as having certain visual properties, affected it's occupancy. At the same time, the new findings did not contradict the previous study, only showed that with the introduction of the new seating type considered more comfortable, the user preference for the area increased dramatically, as the preference for alternative seating in less visually integrated positions decreased. Additionally, it was found that visual integration, control and connectedness was more directly linked to the frequency of seat-occupancy than the straightforward isovist visual-field. Inter-visibility between seats (and potentially, between people) in themselves yielded indicative (though not conclusive) results for the banquette seating-type, visual adjacency was still more favourably correlated to occupancy then out-right field of vision, implying that people sit in places they can see other people (unless it is too visually vulnerable a position).

Returning to Robson and Kimes' (2004) study of seating configuration in relation to spending habits, this paper asserts that dining and drinking as social activities affect the nature of time spent in the restaurant or bar-space. While dining, time spent eating is limited and the amount of food consumed is predictable, it can be expected that the longer a person stays in a drinking-place, they are not usually restricted as that in a dining situation, and the longer they stay, it is likely that the more they will spend on drinks. Therefore, a high turnover of customer is not necessarily better than loner-staying ones. However, it would be interesting to compare the two types of "drinkers" in terms of drinks consumed and expenditure. In the end, further research into the effectiveness of analysing the visual properties of space in terms of occupancy and customer orientation would strengthen this studies assertions, as well as, extending the analytical techniques to a wider range of layout possibilities in which to study person-positioning in relation to desired inter-visibility.

Appendices

Appendix A. Combined Table of Values.

Seat/Isovist Codes	Occupancy (July+August)	Isovist Areas* (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency** (Normalised)	VGA Connectivty	VGA Integration	VGA Control	VGA Controllability
Seat 01	14	13.79	8	13	21	14.5	233	9.46924	0.465348	0.121039
Seat 02	13	27.62	15	16	31	23	577	11.898	0.678739	0.299429
Seat 03	30	41.48	24	16	40	32	781	14.0178	0.670303	0.405293
Seat 04	64	51.14	36	17	53	44.5	1135	20.2912	0.872178	0.588998
Seat 05	193	63.31	41	7	48	44.5	1080	18.9721	0.837028	0.560457
Seat 06	104	63.31	41	7	48	44.5	892	15.5076	0.725339	0.463136
Seat 07	95	55.12	31	6	37	34	778	13.969	0.657866	0.403946
Seat 08	65	87.54	57	12	69	63	1124	24.4298	0.912365	0.658537
Seat 09	55	93.12	59	15	74	66.5	1351	27.9137	0.966384	0.70109
Seat 10	73	85.52	62	11	73	67.5	1402	30.6305	0.997219	0.727556
Seat 11	76	111.24	32	16	48	40	1416	31.4713	0.999758	0.734821
Seat 12	55	99.26	47	16	63	55	1256	23.9558	0.947203	0.65179
Seat 13	100	132.38	70	14	84	77	1717	74.6528	1.13321	0.893805
Seat 14	105	147.92	70	16	86	78	1714	73.6255	1.13021	0.892244
Seat 15	127	159.62	72	12	84	78	1709	71.9747	1.12838	0.889641
Seat 16	125	147.92	75	10	85	80	1704	70.3963	1.12543	0.887038
Seat 17	109	164.09	76	10	86	81	1703	70.0889	1.12175	0.886517
Seat 18	108	164.79	76	10	86	81	1706	71.0193	1.12246	0.888079
Seat 19	112	169.91	77	9	86	81.5	1724	77.1652	1.1326	0.897449
Seat 20	116	172.35	77	9	86	81.5	1734	81.0624	1.13936	0.902655
Seat 21	133	176.87	74	10	84	79	1742	84.4756	1.14571	0.906819
Seat 22	122	188.36	74	10	84	79	1742	84.4756	1.14502	0.906819
Seat 23	109	173.55	63	10	73	68	1737	84.9225	1.16159	0.901401
Seat 24	93	175.77	75	9	84	79.5	1739	85.8308	1.14908	0.902439
Seat 25	34	186.61	73	13	86	79.5	1722	78.6782	1.13674	0.893617
Seat 26	37	189.71	61	12	73	67	1729	81.4739	1.14915	0.89725
Seat 27	12	189.26	54	26	80	67	1571	45.2123	1.03489	0.808511
Seat 28	13	182.27	70	14	84	77	1526	40.1259	1.0076	0.791905
Seat 29	51	162.77	71	14	85	78	1713	73.2893	1.12663	0.891723
Seat 30	66	163.31	71	13	84	77.5	1715	73.9648	1.13032	0.892764
Seat 31	99	165.81	73	12	85	79	1703	70.0889	1.1225	0.886517
Seat 32	118	166.991	84	4	88	86	1689	66.0508	1.11095	0.87923
Seat 33	95	168.42	74	10	84	79	1692	66.8765	1.10911	0.880791
Seat 34	95	168.27	76	10	86	81	1715	73.9648	1.12498	0.892764
Seat 35	70	171.82	64	13	77	70.5	1730	79.4572	1.13576	0.900573
Seat 36	92	173.43	77	12	89	83	1736	81.8896	1.14045	0.903696
Seat 37	82	174.75	76	12	88	82	1744	88.1888	1.14866	0.905034
Seat 38	73	173.67	77	11	88	82.5	1730	81.8896	1.13973	0.897769
Seat 39	49	179.24	74	13	87	80.5	1711	74.6528	1.12514	0.887909
Seat 40	28	177.96	73	10	83	78	1716	76.4303	1.13256	0.890503
Seat B01	62	114.57	46	24	70	58	1319	26.1833	0.861049	0.686622
Seat B02	182	156.85	70	10	80	75	1640	54.967	1.0604	0.853722
Seat B03	97	154.43	74	11	85	79.5	1633	53.6801	1.06178	0.850078
Seat B04	94	162.44	76	10	86	81	1654	57.7351	1.07755	0.86101
Seat B05	70	169.01	63	10	73	68	1703	70.0889	1.119	0.886517
Seat B06	54	172.5	78	11	89	83.5	1713	73.2893	1.12779	0.891723
Seat B07	59	173.83	77	11	88	82.5	1712	75.0017	1.12624	0.888428
Seat B08	57	176.73	43	12	55	49	1711	74.6528	1.12586	0.887909
Seat B09	58	177.67	69	12	81	75	1704	72.2989	1.12136	0.884276
Seat B10	61	174.64	74	9	83	78.5	1692	68.5913	1.11561	0.878049
Seat B11	47	165.86	72	11	83	77.5	1674	63.6919	1.10432	0.868708
Seat B12	44	151.44	74	11	85	79.5	1696	69.7842	1.12456	0.880125
Seat B13	124	170.33	71	9	80	75.5	1663	63.9456	1.09662	0.862999
Seat B14	144	186.56	71	10	81	76	1633	54.7794	1.07535	0.847431
Seat B15	62	181.36	61	16	77	69	1542	41.7978	1.04051	0.800208
Seat B16	51	160.24	50	28	78	64	1427	32.165	0.966513	0.740529
Seat B17	57	172.57	61	16	77	69	1358	28.3075	0.912481	0.705241
Seat B18	68	173.32	59	14	73	66	1393	30.1132	0.950967	0.722885
Seat B19	23	175.48	64	13	77	70.5	1491	36.8974	1.01612	0.773742
Seat B20	17	174.41	45	30	75	60	1523	39.8272	1.04646	0.790348
Seat B21	19	169.8	69	13	82	75.5	1494	37.1536	1.03847	0.775298
Seat B22	29	169.14	74	12	86	80	1530	40.5312	1.0552	0.79398
Seat B23	33	168.12	39	40	79	59	1614	51.4435	1.10137	0.837571
Seat B24	40	157.33	80	10	90	85	1684	1.14574	1.12729	0.859367
Seat B25	49	159.1	80	9	89	84.5	1714	75.7092	1.17298	0.889466
Seat B26	28	151.66	81	9	90	85.5	1698	70.7064	1.16027	0.881681
Seat B27	38	135.82	79	9	88	83.5	1666	61.7321	1.13026	0.864556
Seat B28	43	122.52	79	9	88	83.5	1647	57.5282	1.11853	0.854696
Seat B29	31	118	75	12	87	81	1587	47.3462	1.0758	0.82356
Seat B30	10	104.11	68	13	81	74.5	1535	41.0495	1.04067	0.796575
Seat B31	7	123.28	54	11	65	59.5	1434	32.2296	0.975716	0.746486
Seat B32	15	107.56	51	18	69	60	1319	26.1833	0.905526	0.686622
Seat S01	125	105.97	55	6	61	58	1126	19.5975	0.729056	0.590147
Seat S02	141	120.01	61	5	66	63.5	1278	24.1359	0.81967	0.66911
Seat S03	100	156.35	63	9	72	67.5	1400	29.5587	0.891872	0.732984
Seat S04	98	159.36	61	11	72	66.5	1455	32.8901	0.936172	0.76178
Seat S05	54	151.23	71	9	80	75.5	1464	33.5081	0.947886	0.766492
Seat S06	105	167.56	62	11	73	67.5	1449	32.4906	0.924583	0.758639
Seat S07	84	168.43	64	12	76	70	1506	36.7285	0.969245	0.788482
Seat S08	95	175.35	53	21	74	63.5	1464	33.5081	0.935769	0.766492
Seat S09	97	175.44	67	8	75	71	1501	36.313	0.966073	0.785864
Seat S10	37	174.03	65	7	72	68.5	1552	41.0495	1.00296	0.812565
Seat S11	51	176	65	11	76	70.5	1436	31.6575	0.916614	0.751832
Seat S12	41	176.27	65	8	73	69	1460	33.2306	0.940842	0.764398
Seat S13	72	177.6	60	14	74	67	1362	26.0135	0.8412	0.694241
Seat S14	66	178.08	63	11	74	68.5	1343	26.7506	0.861949	0.703141
Seat S15	22	177.95	64	6	70	67	1420	30.689	0.924079	0.743455

* The Isovist areas in this table refers to the field of vision recorded in Appendix B.2 at a seated position (black shaded area) rather than a standing position (black and grey area), in relation to fixed furniture.

** Normalised Adjacency Values here are derived by assigning a value of 1 to all other seats that can be seen from a particular seat at full visibility, while a value of 0.5 is assigned to a seat that is partially visible from the originating coded seat. The values are then added together to represent the visibility value of that seat numerically in relation to other seats. Note: this is a simple aggregation, and differentiated from Braaksma and Cook's (1980) Visibility Index which calculates the potential visibility of an object or an area in relation (in terms of percentages) to the highest possible visibility (being 100%) of the space (Braaksma and Cook, 1980, et.al).

Appendix A. Combined Table of Values.

Seat/Isovist Codes	Occupancy (July+August)	Isovist Areas* (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency** (Normalised)	VGA Connectivty	VGA Integration	VGA Control	VGA Controllability
Seat 01	14	13.79	8	13	21	14.5	233	9.46924	0.465348	0.121039
Seat 02	13	27.62	15	16	31	23	577	11.898	0.678739	0.299429
Seat 03	30	41.48	24	16	40	32	781	14.0178	0.670303	0.405293
Seat 04	64	51.14	36	17	53	44.5	1135	20.2912	0.872178	0.588998
Seat 05	193	63.31	41	7	48	44.5	1080	18.9721	0.837028	0.560457
Seat 06	104	63.31	41	7	48	44.5	892	15.5076	0.725339	0.463136
Seat 07	95	55.12	31	6	37	34	778	13.969	0.657866	0.403946
Seat 08	65	87.54	57	12	69	63	1124	24.4298	0.912365	0.658537
Seat 09	55	93.12	59	15	74	66.5	1351	27.9137	0.966384	0.70109
Seat 10	73	85.52	62	11	73	67.5	1402	30.6305	0.997219	0.727556
Seat 11	76	111.24	32	16	48	40	1416	31.4713	0.999758	0.734821
Seat 12	55	99.26	47	16	63	55	1256	23.9558	0.947203	0.65179
Seat 13	100	132.38	70	14	84	77	1717	74.6528	1.13321	0.893805
Seat 14	105	147.92	70	16	86	78	1714	73.6255	1.13021	0.892244
Seat 15	127	159.62	72	12	84	78	1709	71.9747	1.12838	0.889641
Seat 16	125	147.92	75	10	85	80	1704	70.3963	1.12543	0.887038
Seat 17	109	164.09	76	10	86	81	1703	70.0889	1.12175	0.886517
Seat 18	108	164.79	76	10	86	81	1706	71.0193	1.12246	0.888079
Seat 19	112	169.91	77	9	86	81.5	1724	77.1652	1.1326	0.897449
Seat 20	116	172.35	77	9	86	81.5	1734	81.0624	1.13936	0.902655
Seat 21	133	176.87	74	10	84	79	1742	84.4756	1.14571	0.906819
Seat 22	122	188.36	74	10	84	79	1742	84.4756	1.14502	0.906819
Seat 23	109	173.55	63	10	73	68	1737	84.9225	1.16159	0.901401
Seat 24	93	175.77	75	9	84	79.5	1739	85.8308	1.14908	0.902439
Seat 25	34	186.61	73	13	86	79.5	1722	78.6782	1.13674	0.893617
Seat 26	37	189.71	61	12	73	67	1729	81.4739	1.14915	0.89725
Seat 27	12	189.26	54	26	80	67	1571	45.2123	1.03489	0.808511
Seat 28	13	182.27	70	14	84	77	1526	40.1259	1.0076	0.791905
Seat 29	51	162.77	71	14	85	78	1713	73.2893	1.12663	0.891723
Seat 30	66	163.31	71	13	84	77.5	1715	73.9648	1.13032	0.892764
Seat 31	99	165.81	73	12	85	79	1703	70.0889	1.1225	0.886517
Seat 32	118	166.991	84	4	88	86	1688	66.0508	1.11095	0.87923
Seat 33	95	168.42	74	10	84	79	1692	66.8765	1.10911	0.880791
Seat 34	95	168.27	76	10	86	81	1715	73.9648	1.12498	0.892764
Seat 35	70	171.82	64	13	77	70.5	1730	79.4572	1.13576	0.900573
Seat 36	92	173.43	77	12	89	83	1736	81.8896	1.14045	0.903696
Seat 37	82	174.75	76	12	88	82	1744	88.1888	1.14866	0.905034
Seat 38	73	173.67	77	11	88	82.5	1730	81.8896	1.13973	0.897769
Seat 39	49	179.24	74	13	87	80.5	1711	74.6528	1.12514	0.887909
Seat 40	28	177.96	73	10	83	78	1716	76.4303	1.13256	0.890503

Banquette Correlations	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.146	0.359	-0.626	0.246	0.305	0.308	0.287	0.299	0.311

* The Isovist areas in this table refers to the field of vision recorded in Appendix B.2 at a seated position (black shaded area) rather than a standing position (black and grey area), in relation to fixed furniture.

** Normalised Adjacency Values here are derived by assigning a value of 1 to all other seats that can be seen from a particular seat at full visibility, while a value of 0.5 is assigned to a seat that is partially visible from the originating coded seat. The values are then added together to represent the visibility value of that seat numerically in relation to other seats. Note: this is a simple aggregation, and differentiated from Braaksma and Cook's (1980) Visibility Index which calculates the potential visibility of an object or an area in relation (in terms of percentages) to the highest possible visibility (being 100%) of the space (Braaksma and Cook, 1980, et.al).

Appendix A. Combined Table of Values.

Seat/Isovist Codes	Occupancy (July+August)	Isovist Areas* (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency** (Normalised)	VGA Connectivty	VGA Integration	VGA Control	VGA Controllability
Seat B01	62	114.57	46	24	70	58	1319	26.1833	0.861049	0.686622
Seat B02	182	156.85	70	10	80	75	1640	54.967	1.0604	0.853722
Seat B03	97	154.43	74	11	85	79.5	1633	53.6801	1.06178	0.850078
Seat B04	94	162.44	76	10	86	81	1654	57.7351	1.07755	0.86101
Seat B05	70	169.01	63	10	73	68	1703	70.0889	1.119	0.886517
Seat B06	54	172.5	78	11	89	83.5	1713	73.2893	1.12779	0.891723
Seat B07	59	173.83	77	11	88	82.5	1712	75.0017	1.12624	0.888428
Seat B08	57	176.73	43	12	55	49	1711	74.6528	1.12586	0.887909
Seat B09	58	177.67	69	12	81	75	1704	72.2989	1.12136	0.884276
Seat B10	61	174.64	74	9	83	78.5	1692	68.5913	1.11561	0.878049
Seat B11	47	165.86	72	11	83	77.5	1674	63.6919	1.10432	0.868708
Seat B12	44	151.44	74	11	85	79.5	1696	69.7842	1.12456	0.880125
Seat B13	124	170.33	71	9	80	75.5	1663	63.9456	1.09662	0.862999
Seat B14	144	186.56	71	10	81	76	1633	54.7794	1.07535	0.847431
Seat B15	62	181.36	61	16	77	69	1542	41.7978	1.04051	0.800208
Seat B16	51	160.24	50	28	78	64	1427	32.165	0.966513	0.740529
Seat B17	57	172.57	61	16	77	69	1359	28.3075	0.912481	0.705241
Seat B18	68	173.32	59	14	73	66	1393	30.1132	0.950967	0.722885
Seat B19	23	175.48	64	13	77	70.5	1491	36.8974	1.01612	0.773742
Seat B20	17	174.41	45	30	75	60	1523	39.8272	1.04646	0.790348
Seat B21	19	169.8	69	13	82	75.5	1494	37.1536	1.03847	0.775298
Seat B22	29	169.14	74	12	86	80	1530	40.5312	1.0552	0.79398
Seat B23	33	168.12	39	40	79	59	1614	51.4435	1.10137	0.837571
Seat B24	40	157.33	80	10	90	85	1684	1.14574	1.12729	0.859367
Seat B25	49	159.1	80	9	89	84.5	1714	75.7092	1.17298	0.889466
Seat B26	28	151.66	81	9	90	85.5	1699	70.7064	1.16027	0.881681
Seat B27	38	135.82	79	9	88	83.5	1666	61.7321	1.13026	0.864556
Seat B28	43	122.52	79	9	88	83.5	1647	57.5282	1.11853	0.854696
Seat B29	31	118	75	12	87	81	1587	47.3462	1.0758	0.82356
Seat B30	10	104.11	68	13	81	74.5	1535	41.0495	1.04067	0.796575
Seat B31	7	123.28	54	11	65	59.5	1434	32.2296	0.975716	0.746486
Seat B32	15	107.56	51	18	69	60	1319	26.1833	0.905526	0.686622

Low Bench Correlations	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.353	0.179	-0.252	0.051	0.134	0.272	0.259	0.096	0.282

* The Isovist areas in this table refers to the field of vision recorded in Appendix B.2 at a seated position (black shaded area) rather than a standing position (black and grey area), in relation to fixed furniture.

** Normalised Adjacency Values here are derived by assigning a value of 1 to all other seats that can be seen from a particular seat at full visibility, while a value of 0.5 is assigned to a seat that is partially visible from the originating coded seat. The values are then added together to represent the visibility value of that seat numerically in relation to other seats. Note: this is a simple aggregation, and differentiated from Braaksma and Cook's (1980) Visibility Index which calculates the potential visibility of an object or an area in relation (in terms of percentages) to the highest possible visibility (being 100%) of the space (Braaksma and Cook, 1980, et.al).

Seat/Isovist Codes	Occupancy (July+August)	Isovist Areas* (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency** (Normalised)	VGA Connectivty	VGA Integration	VGA Control	VGA Controllability
Seat S01	125	105.97	55	6	61	58	1126	19.5975	0.729056	0.590147
Seat S02	141	120.01	61	5	66	63.5	1278	24.1359	0.81967	0.66911
Seat S03	100	156.35	63	9	72	67.5	1400	29.5587	0.891872	0.732984
Seat S04	98	159.36	61	11	72	66.5	1455	32.8901	0.936172	0.76178
Seat S05	54	151.23	71	9	80	75.5	1464	33.5081	0.947886	0.766492
Seat S06	105	167.56	62	11	73	67.5	1449	32.4906	0.924583	0.758639
Seat S07	84	168.43	64	12	76	70	1506	36.7285	0.969245	0.788482
Seat S08	95	175.35	53	21	74	63.5	1464	33.5081	0.935769	0.766492
Seat S09	97	175.44	67	8	75	71	1501	36.313	0.966073	0.785864
Seat S10	37	174.03	65	7	72	68.5	1552	41.0495	1.00296	0.812565
Seat S11	51	176	65	11	76	70.5	1436	31.6575	0.916614	0.751832
Seat S12	41	176.27	65	8	73	69	1460	33.2306	0.940842	0.764398
Seat S13	72	177.6	60	14	74	67	1362	26.0135	0.8412	0.694241
Seat S14	66	178.08	63	11	74	68.5	1343	26.7506	0.861949	0.703141
Seat S15	22	177.95	64	6	70	67	1420	30.689	0.924079	0.743455

Sofa Seating Correlations	Isovist Areas (Seated)	Adjacency (Full)	Adjacency (Partial)	Adjacency (Full+Partial)	Adjacency (Normalised)	Connectivity	Integration	Control	Controllability
Occupancy (July+August)	0.026	-0.139	-0.271	-0.434	-0.286	-0.500	-0.318	-0.615	-0.484

* The Isovist areas in this table refers to the field of vision recorded in Appendix B.2 at a seated position (black shaded area) rather than a standing position (black and grey area), in relation to fixed furniture.

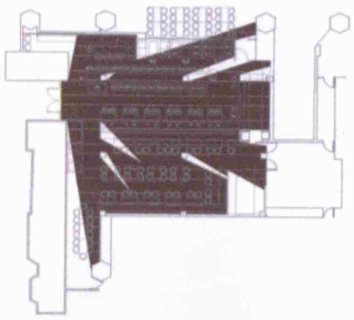
** Normalised Adjacency Values here are derived by assigning a value of 1 to all other seats that can be seen from a particular seat at full visibility, while a value of 0.5 is assigned to a seat that is partially visible from the originating coded seat. The values are then added together to represent the visibility value of that seat numerically in relation to other seats. Note: this is a simple aggregation, and differentiated from Braaksma and Cook's (1980) Visibility Index which calculates the potential visibility of an object or an area in relation (in terms of percentages) to the highest possible visibility (being 100%) of the space (Braaksma and Cook, 1980, et.al).

Appendix B.

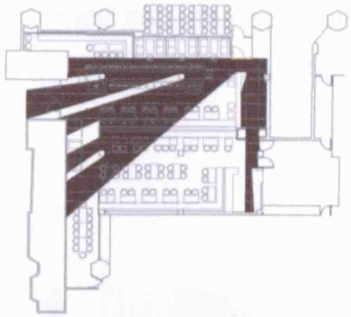
B.1 Isovists

Façade Isovists

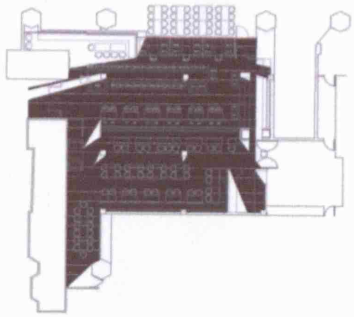
The façade isovist mainly represents the area in the rest of the space from which the vertical surface of, for example, the bar or the entrance, is visible. Also, it represents the accumulated potential field of vision taken from any point along the surface from which the isovist is constructed.



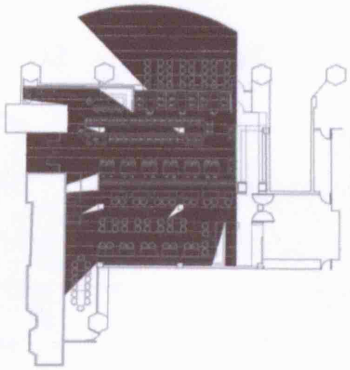
Entrance 1 (main hotel)
Façade Isovist



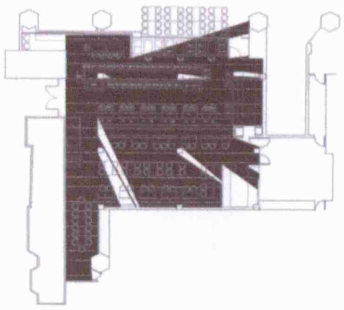
Entrance 2
Façade Isovist



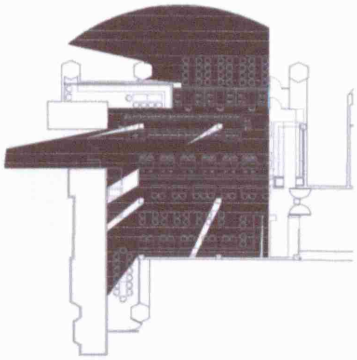
Street Façade Isovist



Bar Façade Isovist



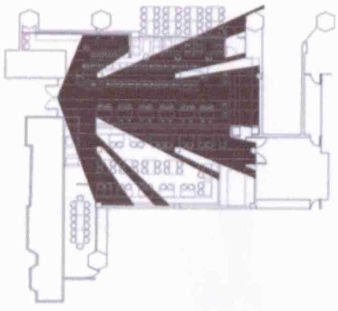
TV Isovist 1



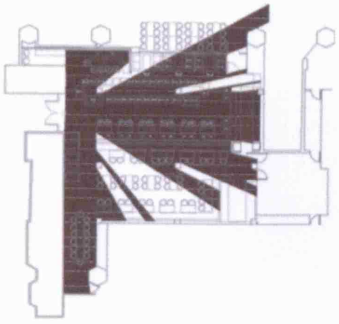
TV Isovist 2

Standing Isovists

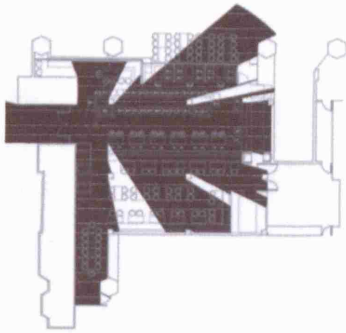
The following 13 isovists are constructed from a standing position (where eye-levels are higher than the1.2m furniture otherwise blocking seated positions) originating from the coloured X that follows a path through the main circulation space through the Lazy Dog bar.



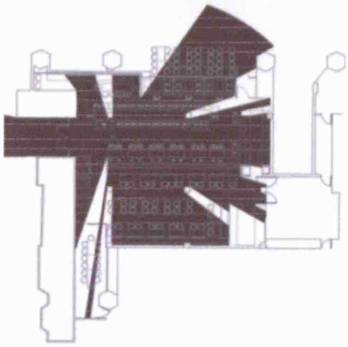
Standing Isovist 01



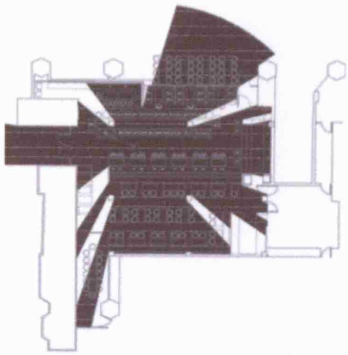
Standing Isovist 02



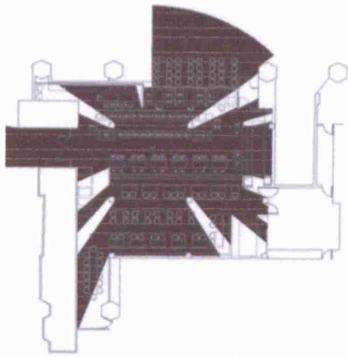
Standing Isovist 03



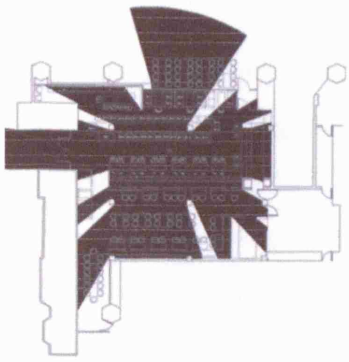
Standing Isovist 04



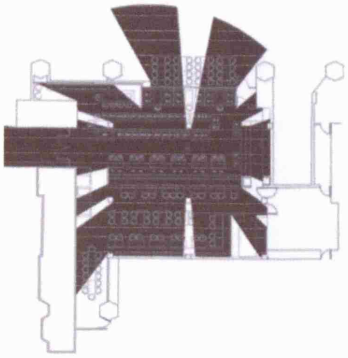
Standing Isovist 05



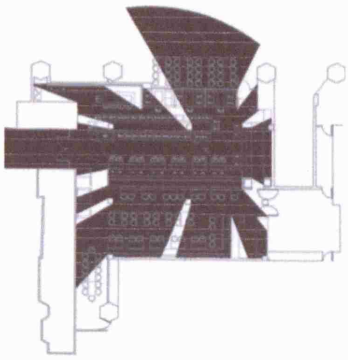
Standing Isovist 06



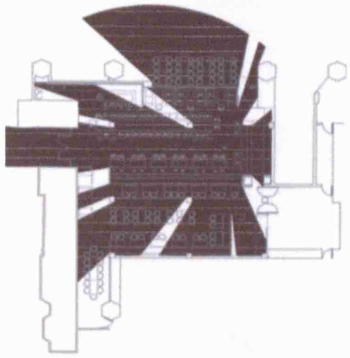
Standing Isovist 07



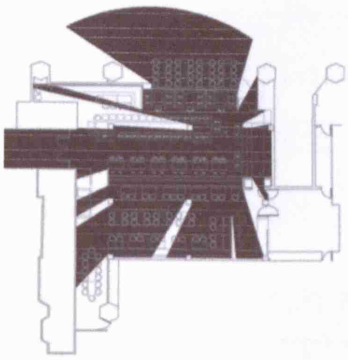
Standing Isovist 08



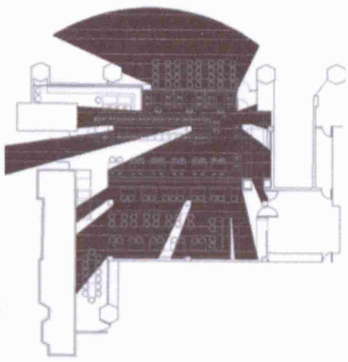
Standing Isovist 09



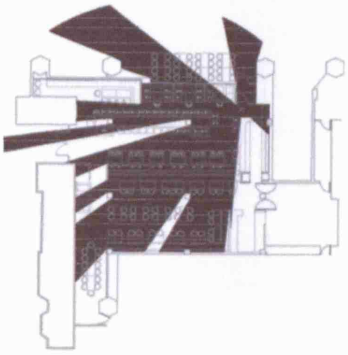
Standing Isovist 10



Standing Isovist 11



Standing Isovist 12

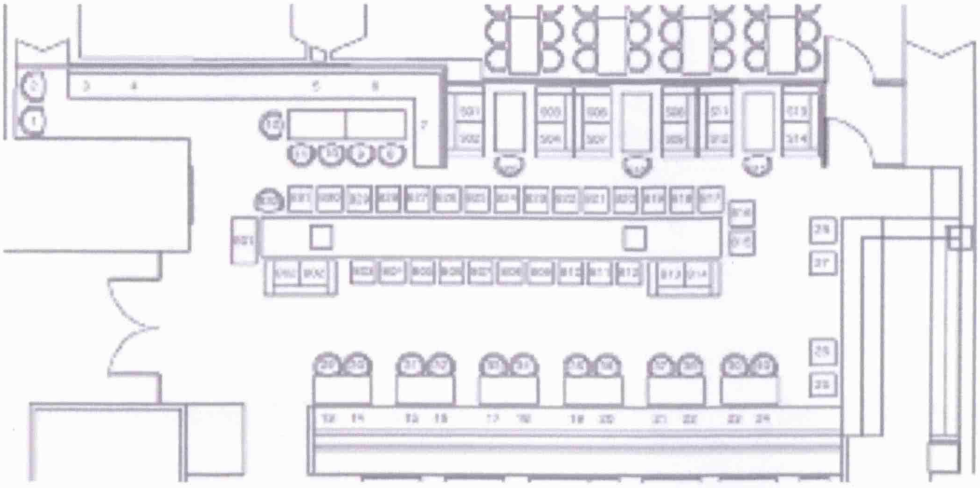


Standing Isovist 13

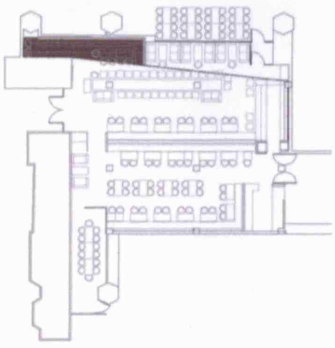
Melisa Chan
Advanced Architectural Studies Thesis 2007

Seat Isovists

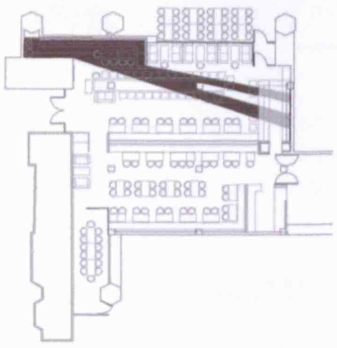
The seated-isovist (field of vision) is represented as the black polygon and the grey area shows partial visibility from the specific seated position due to the furniture that rises to 1.2m above floor height. Therefore, from a standing position represented by each seat code, the full view is afforded; otherwise, a limited (upper half) view of the adjacent restaurant area is possible.



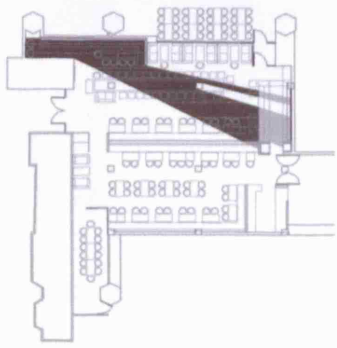
Seat Codes



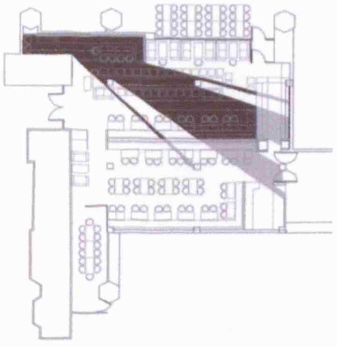
Banquette Isovist (01)



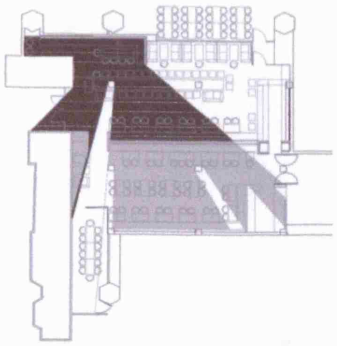
Banquette Isovist (02)



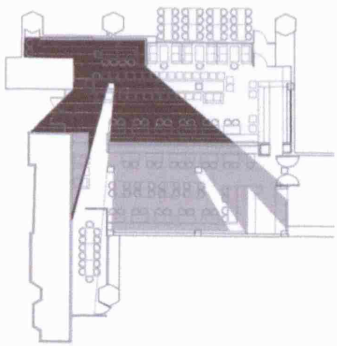
Banquette Isovist (03)



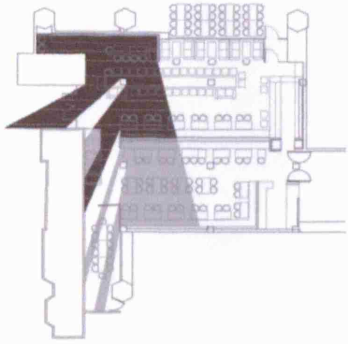
Banquette Isovist (04)



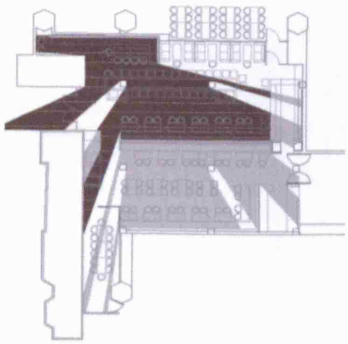
Banquette Isovist (05)



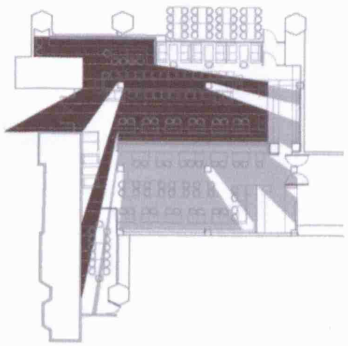
Banquette Isovist (06)



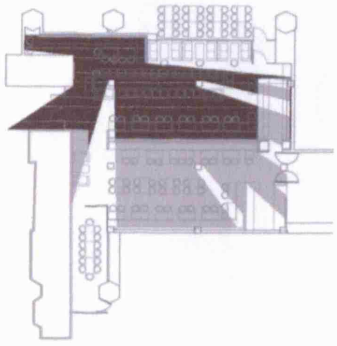
Banquette Isovist (07)



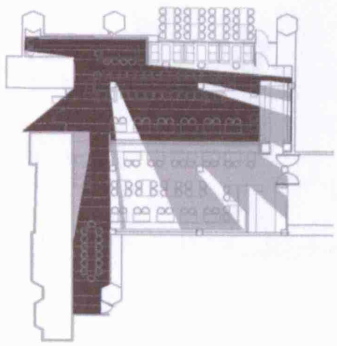
Banquette Isovist (08)



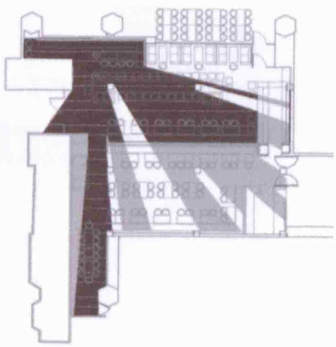
Banquette Isovist (09)



Banquette Isovist (10)

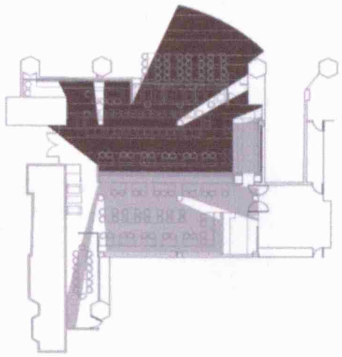


Banquette Isovist (11)

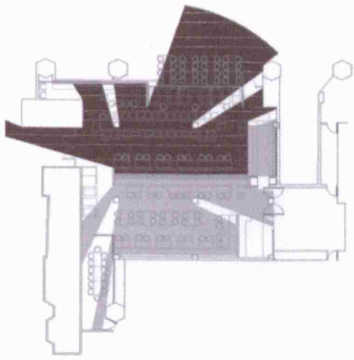


Banquette Isovist (12)

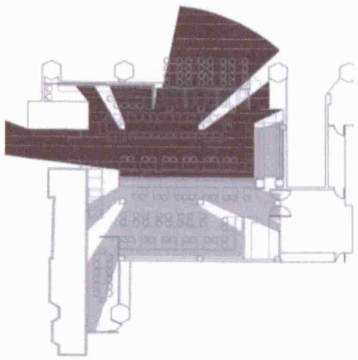
Melisa Chan
Advanced Architectural Studies Thesis 2007



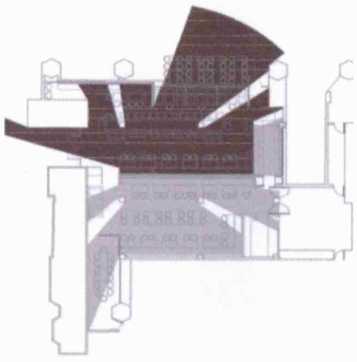
Banquette Isovist (13)



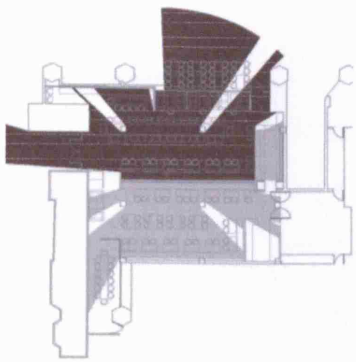
Banquette Isovist (14)



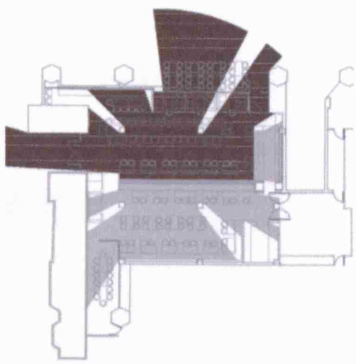
Banquette Isovist (15)



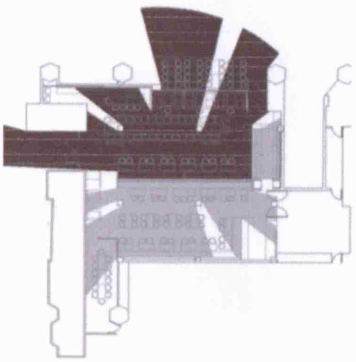
Banquette Isovist (16)



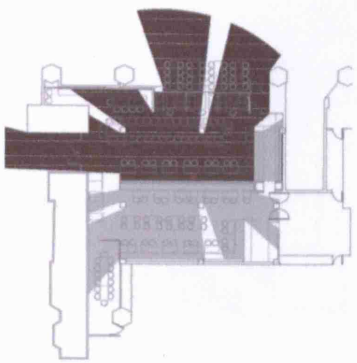
Banquette Isovist (17)



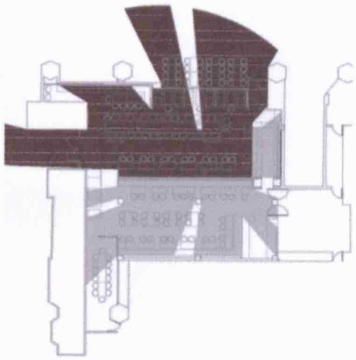
Banquette Isovist (18)



Banquette Isovist (19)

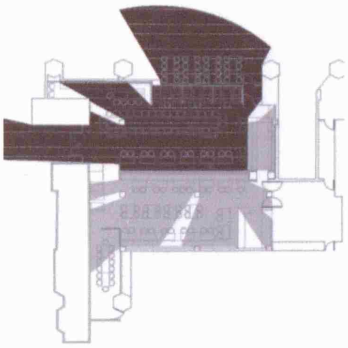


Banquette Isovist (20)

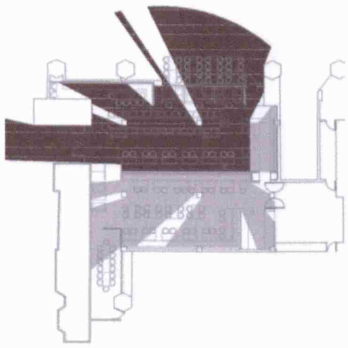


Banquette Isovist (21)

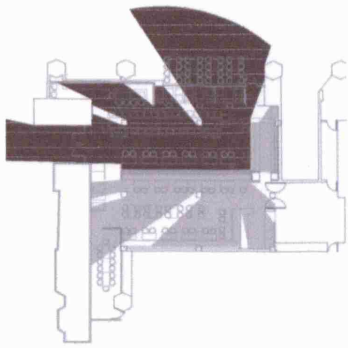
Melisa Chan
Advanced Architectural Studies Thesis 2007



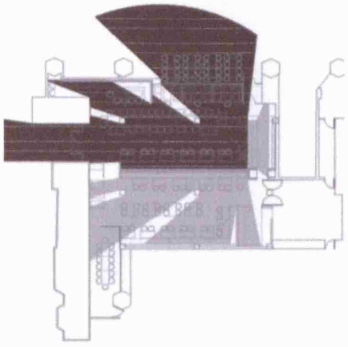
Banquette Isovist (22)



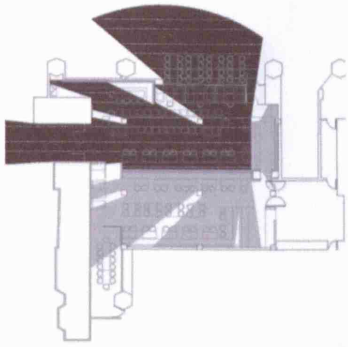
Banquette Isovist (23)



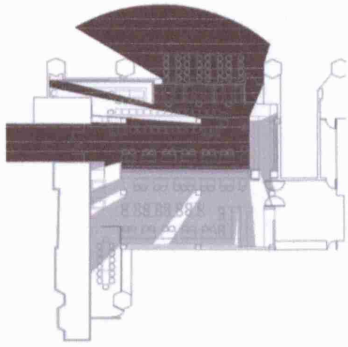
Banquette Isovist (24)



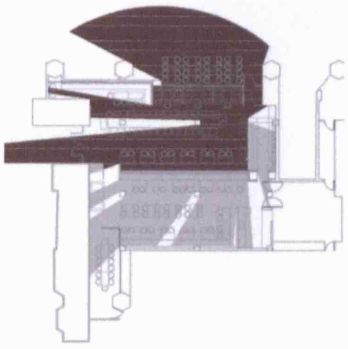
Banquette Isovist (25)



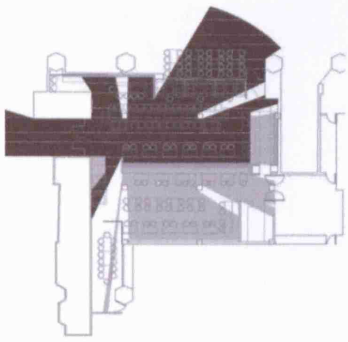
Banquette Isovist (26)



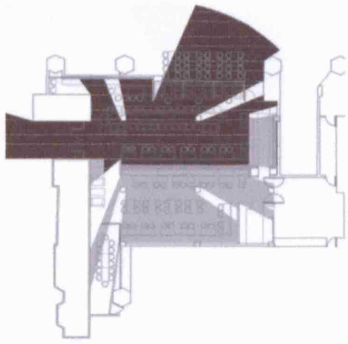
Banquette Isovist (27)



Banquette Isovist (28)

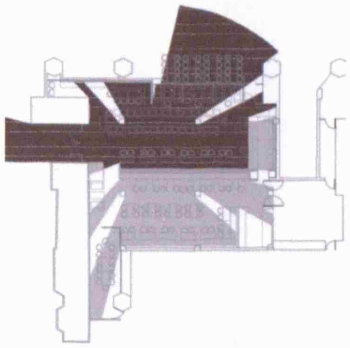


Banquette Isovist (29)

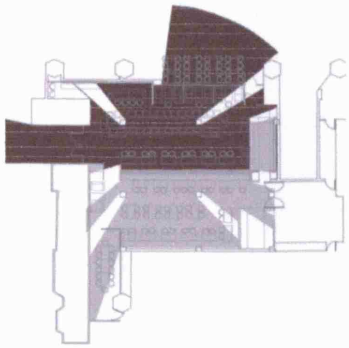


Banquette Isovist (30)

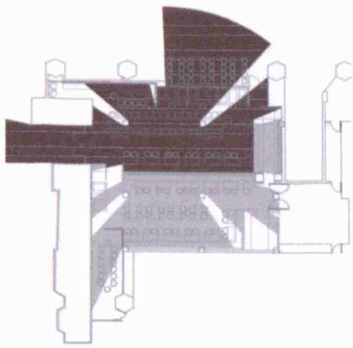
Melisa Chan
Advanced Architectural Studies Thesis 2007



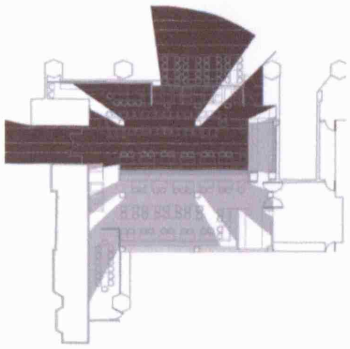
Banquette Isovist (31)



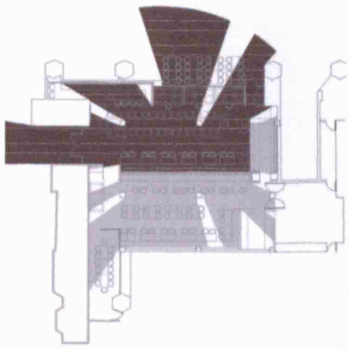
Banquette Isovist (32)



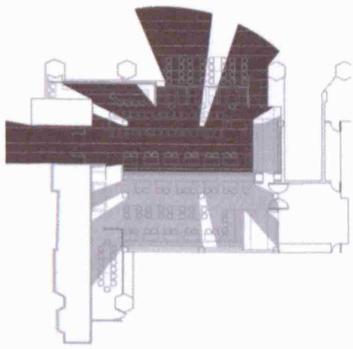
Banquette Isovist (33)



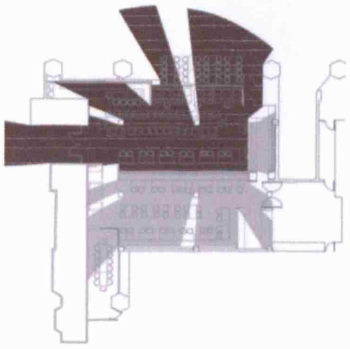
Banquette Isovist (34)



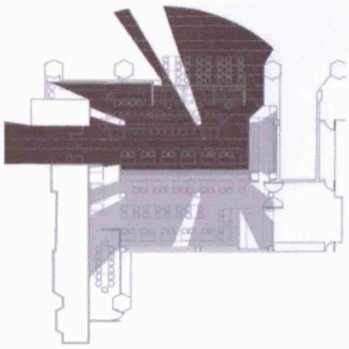
Banquette Isovist (35)



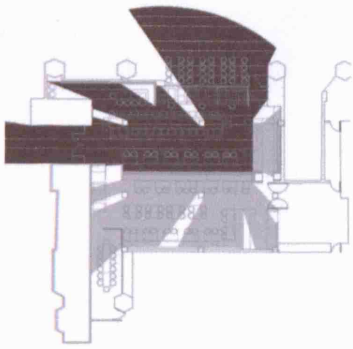
Banquette Isovist (36)



Banquette Isovist (37)

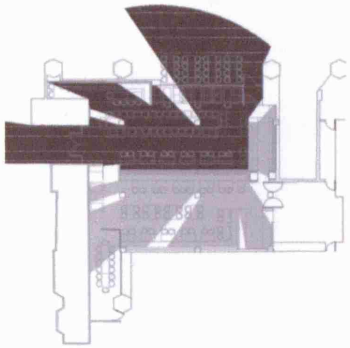


Banquette Isovist (38)



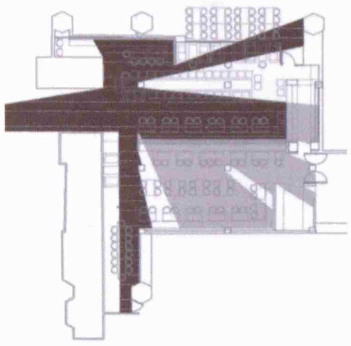
Banquette Isovist (39)

Melisa Chan
Advanced Architectural Studies Thesis 2007

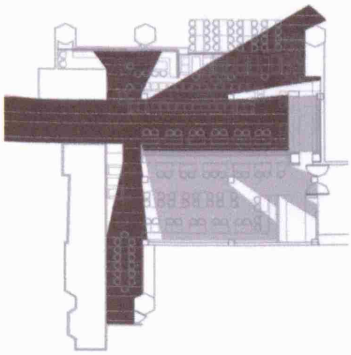


Banquette Isovist (40)

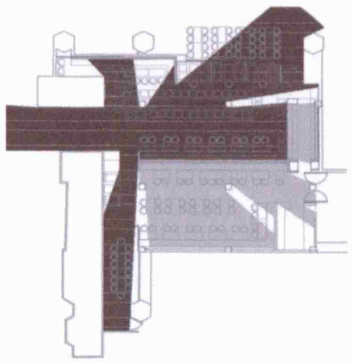
Melisa Chan
Advanced Architectural Studies Thesis 2007



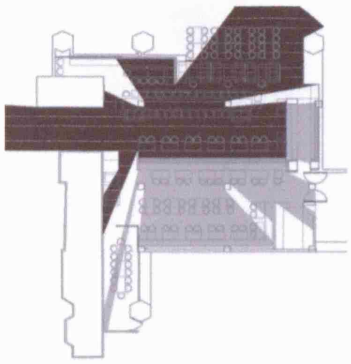
Bench Isovist (B01)



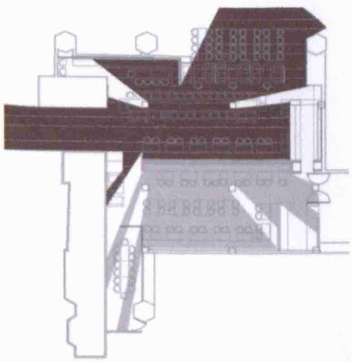
Bench Isovist (B02)



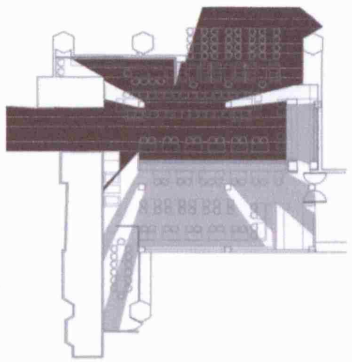
Bench Isovist (B02a)



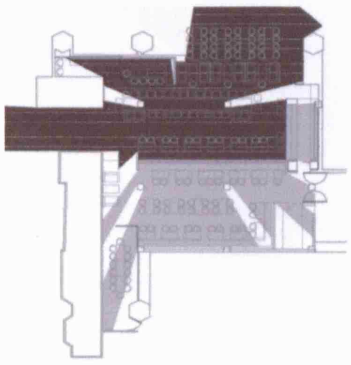
Bench Isovist (B03)



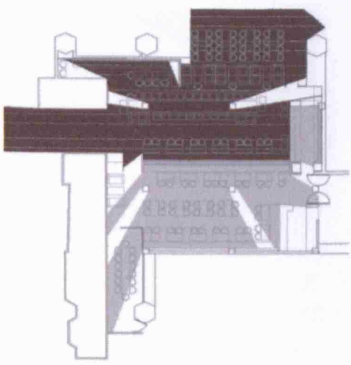
Bench Isovist (B04)



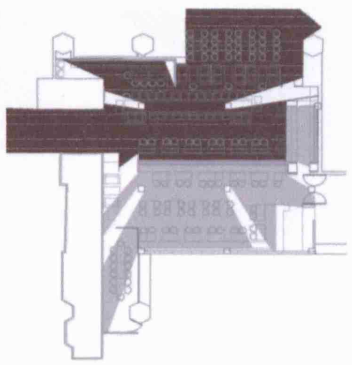
Bench Isovist (B05)



Bench Isovist (B06)

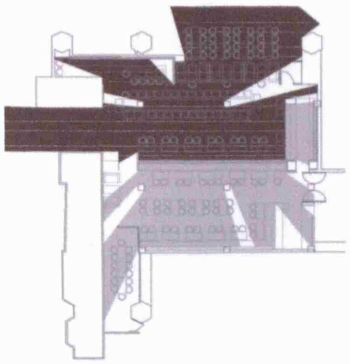


Bench Isovist (B07)

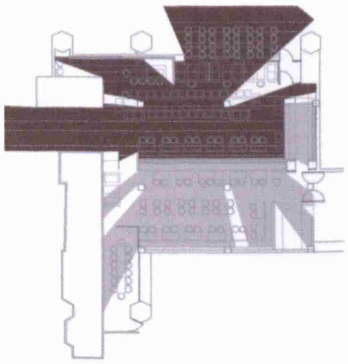


Bench Isovist (B08)

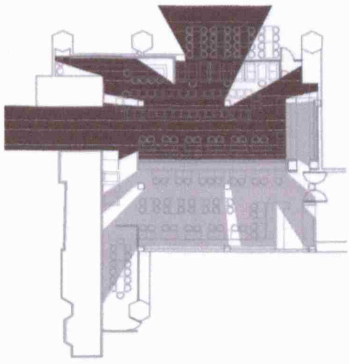
Melisa Chan
Advanced Architectural Studies Thesis 2007



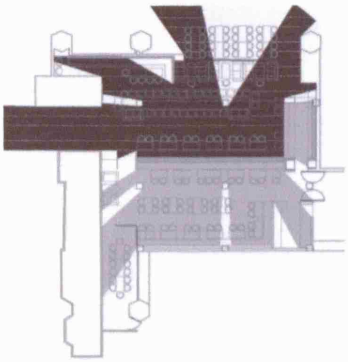
Bench Isovist (B09)



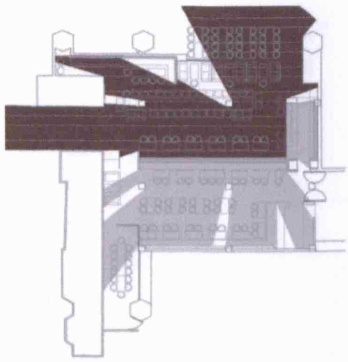
Bench Isovist (B10)



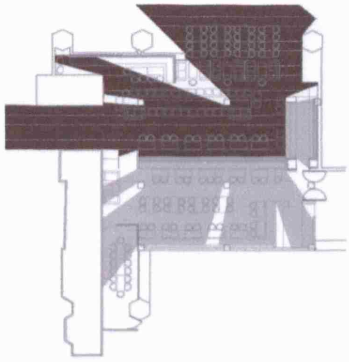
Bench Isovist (B11)



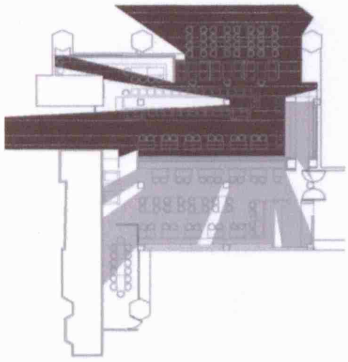
Bench Isovist (B12)



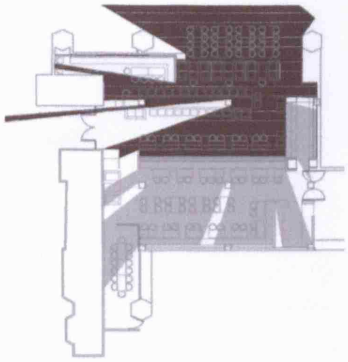
Bench Isovist (B13)



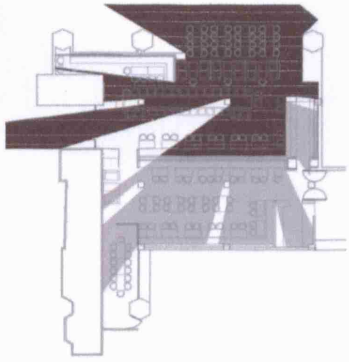
Bench Isovist (B14)



Bench Isovist (B15)

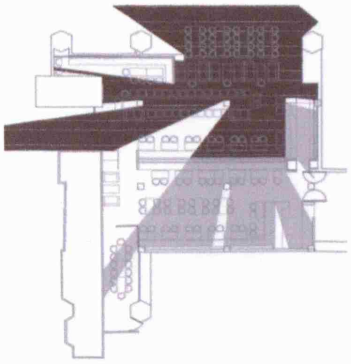


Bench Isovist (B16)

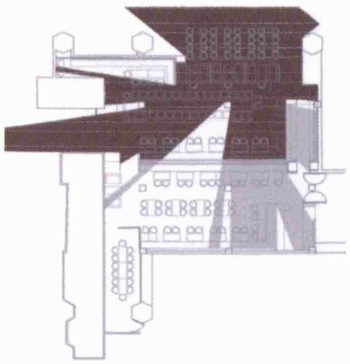


Bench Isovist (B17)

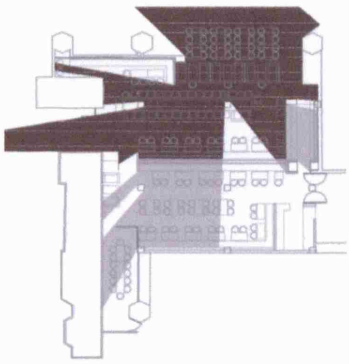
Melisa Chan
Advanced Architectural Studies Thesis 2007



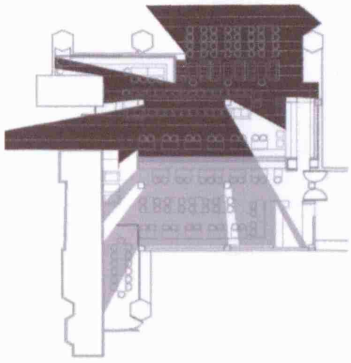
Bench Isovist (B18)



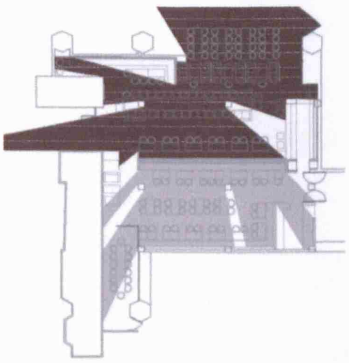
Bench Isovist (B19)



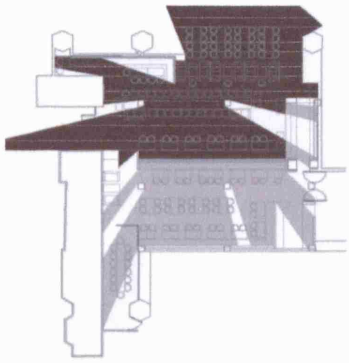
Bench Isovist (B20)



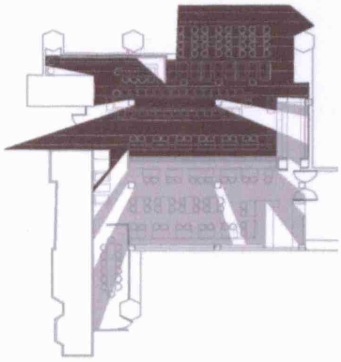
Bench Isovist (B21)



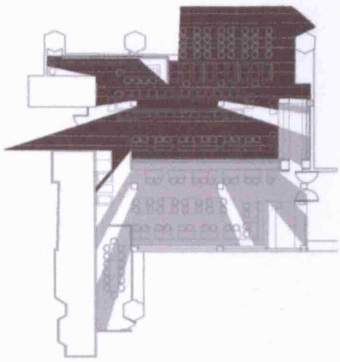
Bench Isovist (B22)



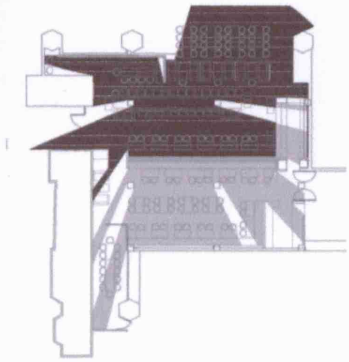
Bench Isovist (B23)



Bench Isovist (B24)

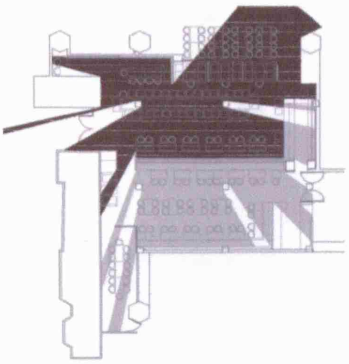


Bench Isovist (B25)

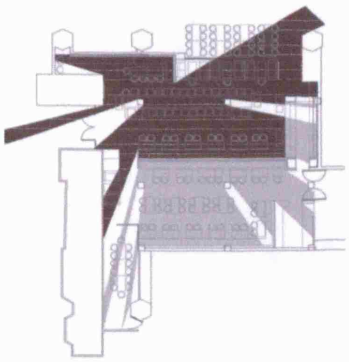


Bench Isovist (B26)

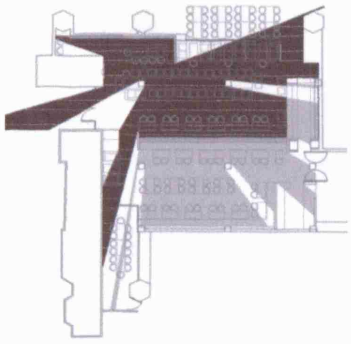
Melisa Chan
Advanced Architectural Studies Thesis 2007



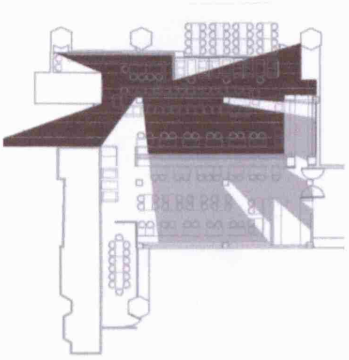
Bench Isovist (B27)



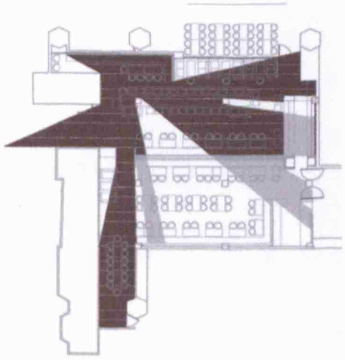
Bench Isovist (B28)



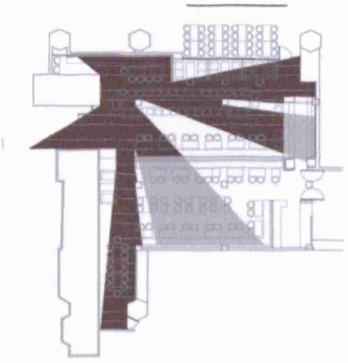
Bench Isovist (B29)



Bench Isovist (B30)

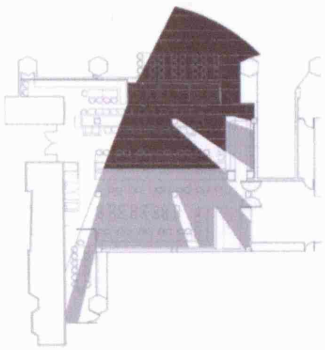


Bench Isovist (B31)

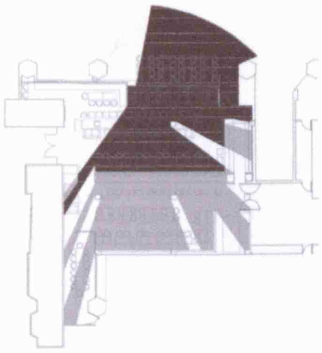


Bench Isovist (B32)

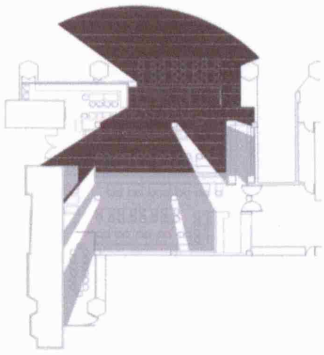
Melisa Chan
Advanced Architectural Studies Thesis 2007



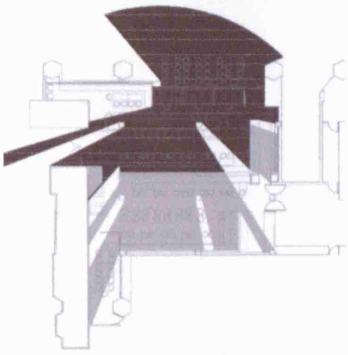
Sofa Isovist (S01)



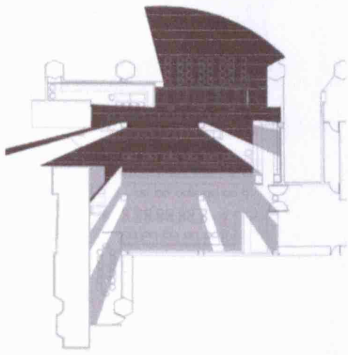
Sofa Isovist (S02)



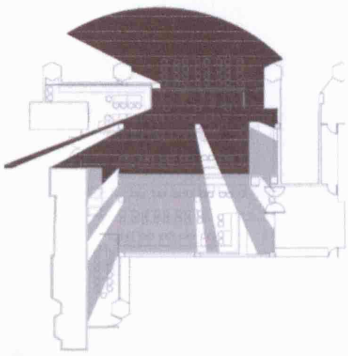
Sofa Isovist (S03)



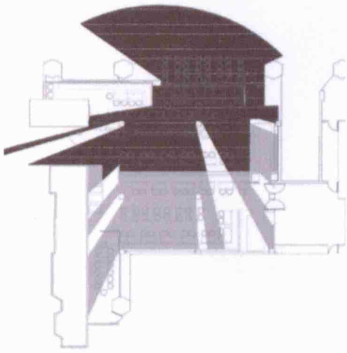
Sofa Isovist (S04)



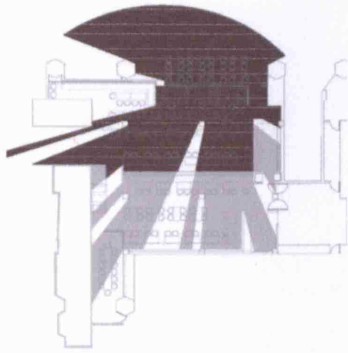
Sofa Isovist (S05)



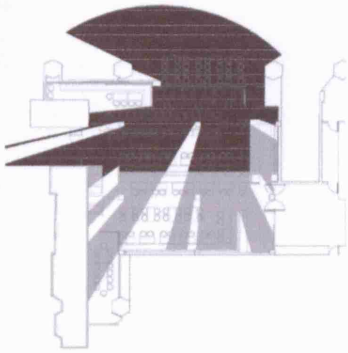
Sofa Isovist (S06)



Sofa Isovist (S07)

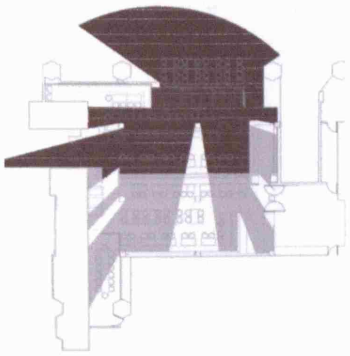


Sofa Isovist (S08)

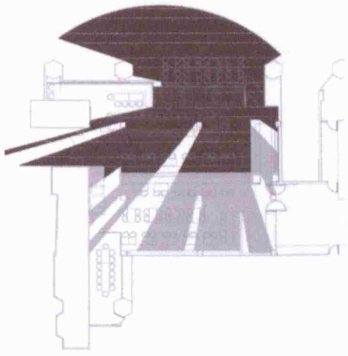


Sofa Isovist (S09)

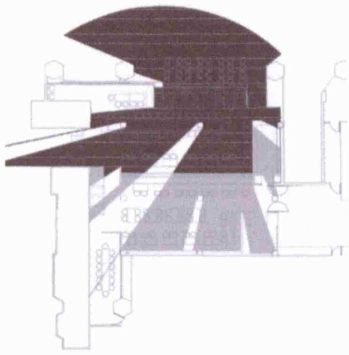
Melisa Chan
Advanced Architectural Studies Thesis 2007



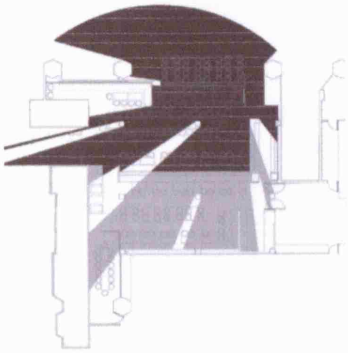
Sofa Isovist (S10)



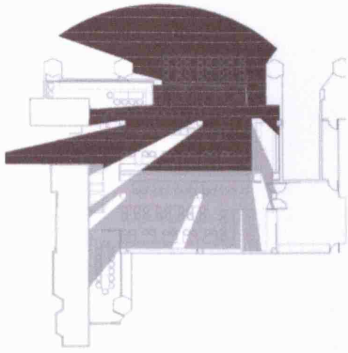
Sofa Isovist (S11)



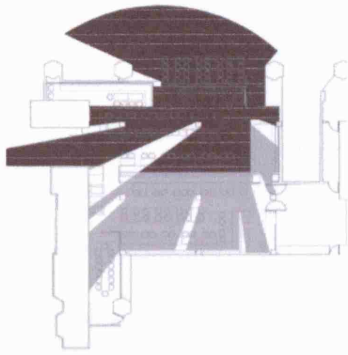
Sofa Isovist (S12)



Sofa Isovist (S13)



Sofa Isovist (S14)



Sofa Isovist (S15)

Melisa Chan
Advanced Architectural Studies Thesis 2007

Appendix B.2.
Isovist Area

Seat codes Seat Codes	Seated Isovist Area (black) (m^2)	Full Isovist (+grey) (m^2)
Main (hotel) entrance	197.52	
Street Entrance	102.91	
Street Glazing	211.79	
TV1	207.45	
TV2	264.97	
Bar	262.96	
Point:		
Standing 01	147.15	
Standing 02	183.78	
Standing 03	241.99	
Standing 04	247.59	
Standing 05	262	
Standing 06	271.21	
Standing 07	266.81	
Standing 08	270.96	
Standing 09	272.08	
Standing 10	288.56	
Standing 11	281.26	
Standing 12	269.36	
Standing 13	213.37	
Seat 01	13.79	
Seat 02	27.62	31.53
Seat 03	41.48	48.25
Seat 04	51.14	68
Seat 05	63.31	134.95
Seat 06	63.31	134.95
Seat 07	55.12	97.57
Seat 08	87.54	170.69
Seat 09	93.12	171.42
Seat 10	85.52	163.79
Seat 11	111.24	172.56
Seat 12	99.26	164.64
Seat 13	132.38	219.76
Seat 14	147.92	239.48
Seat 15	159.62	258.85
Seat 16	147.92	248.07
Seat 17	164.09	261.34
Seat 18	164.79	261.99
Seat 19	169.91	265.77
Seat 20	172.35	269.39
Seat 21	176.87	274.83
Seat 22	188.36	286.07
Seat 23	173.55	271.15
Seat 24	175.77	273.52
Seat 25	186.61	275.24
Seat 26	189.71	284.85
Seat 27	189.26	283.66
Seat 28	182.27	275.77
Seat 29	162.77	248.12
Seat 30	163.31	253.35
Seat 31	165.81	264.32
Seat 32	166.991	266.52
Seat 33	168.42	256.3
Seat 34	168.27	265.87

Appendix B.2.
Isovist Area

Seat codes	Seated Isovist Area (black) (m^2)	Full Isovist (+grey) (m^2)
Seat 35	171.82	269.42
Seat 36	173.43	271.94
Seat 37	174.75	274.29
Seat 38	173.67	274.27
Seat 39	179.24	278.33
Seat 40	177.96	277.95
Seat B01	114.57	182.46
Seat B02	156.85	233.44
Seat B02a	165.78	243.97
Seat B03	154.43	239.44
Seat B04	162.44	242.05
Seat B05	169.01	261.55
Seat B06	172.5	267.13
Seat B07	173.83	267.52
Seat B08	176.73	273.59
Seat B09	177.67	275.1
Seat B10	174.64	273.74
Seat B11	165.86	264.44
Seat B12	151.44	251.41
Seat B13	170.33	270.24
Seat B14	186.56	286.41
Seat B15	181.36	280.47
Seat B16	160.24	258.37
Seat B17	172.57	269.69
Seat B18	173.32	253.27
Seat B19	175.48	225.86
Seat B20	174.41	239.5
Seat B21	169.8	247.92
Seat B22	169.14	258.08
Seat B23	168.12	259.55
Seat B24	157.33	250.55
Seat B25	159.1	250.78
Seat B26	151.66	242.65
Seat B27	135.82	223.55
Seat B28	122.52	205.31
Seat B29	118	198.24
Seat B30	104.11	175.03
Seat B31	123.28	154.94
Seat B32	107.56	152.5
Seat S01	105.97	193.69
Seat S02	120.01	211.28
Seat S03	156.35	242.65
Seat S04	159.36	251.01
Seat S05	151.23	246
Seat S06	167.56	255.56
Seat S07	168.43	253.41
Seat S08	175.35	259.67
Seat S09	175.44	256.17
Seat S10	174.03	256.72
Seat S11	176	249.46
Seat S12	176.27	250.97
Seat S13	177.6	262.57
Seat S14	178.08	267.41
Seat S15	177.95	272.03

Appendix B.2.
Isovist Area

Seat codes descending	Seated Isovist Area (black) (m^2)
Standing 10	288.56
Standing 11	281.26
Standing 09	272.08
Standing 06	271.21
Standing 08	270.96
Standing 12	269.36
Standing 07	266.81
TV2	264.97
Bar	262.96
Standing 05	262
Standing 04	247.59
Standing 03	241.99
Standing 13	213.37
Street Glazing	211.79
TV1	207.45
Main (hotel) entrance	197.52
Seat 26	189.71
Seat 27	189.26
Seat 22	188.36
Seat 25	186.61
Seat B14	186.56
Standing 02	183.78
Seat 28	182.27
Seat B15	181.36
Seat 39	179.24
Seat S14	178.08
Seat 40	177.96
Seat S15	177.95
Seat B09	177.67
Seat S13	177.6
Seat 21	176.87
Seat B08	176.73
Seat S12	176.27
Seat S11	176
Seat 24	175.77
Seat B19	175.48
Seat S09	175.44
Seat S08	175.35
Seat 37	174.75
Seat B10	174.64
Seat B20	174.41
Seat S10	174.03
Seat B07	173.83
Seat 38	173.67
Seat 23	173.55
Seat 36	173.43
Seat B18	173.32
Seat B17	172.57
Seat B06	172.5
Seat 20	172.35
Seat 35	171.82
Seat B13	170.33
Seat 19	169.91
Seat B21	169.8
Seat B22	169.14

Appendix B.2.
Isovist Area

Seat codes descending	Seated Isovist Area (black) (m^2)
Seat B05	169.01
Seat S07	168.43
Seat 33	168.42
Seat 34	168.27
Seat B23	168.12
Seat S06	167.56
Seat 32	166.991
Seat B11	165.86
Seat 31	165.81
Seat B02a	165.78
Seat 18	164.79
Seat 17	164.09
Seat 30	163.31
Seat 29	162.77
Seat B04	162.44
Seat B16	160.24
Seat 15	159.62
Seat S04	159.36
Seat B25	159.1
Seat B24	157.33
Seat B02	156.85
Seat S03	156.35
Seat B03	154.43
Seat B26	151.66
Seat B12	151.44
Seat S05	151.23
Seat 14	147.92
Seat 16	147.92
Standing 01	147.15
Seat B27	135.82
Seat 13	132.38
Seat B31	123.28
Seat B28	122.52
Seat S02	120.01
Seat B29	118
Seat B01	114.57
Seat 11	111.24
Seat B32	107.56
Seat S01	105.97
Seat B30	104.11
Street Entrance	102.91
Seat 12	99.26
Seat 09	93.12
Seat 08	87.54
Seat 10	85.52
Seat 05	63.31
Seat 06	63.31
Seat 07	55.12
Seat 04	51.14
Seat 03	41.48
Seat 02	27.62
Seat 01	13.79

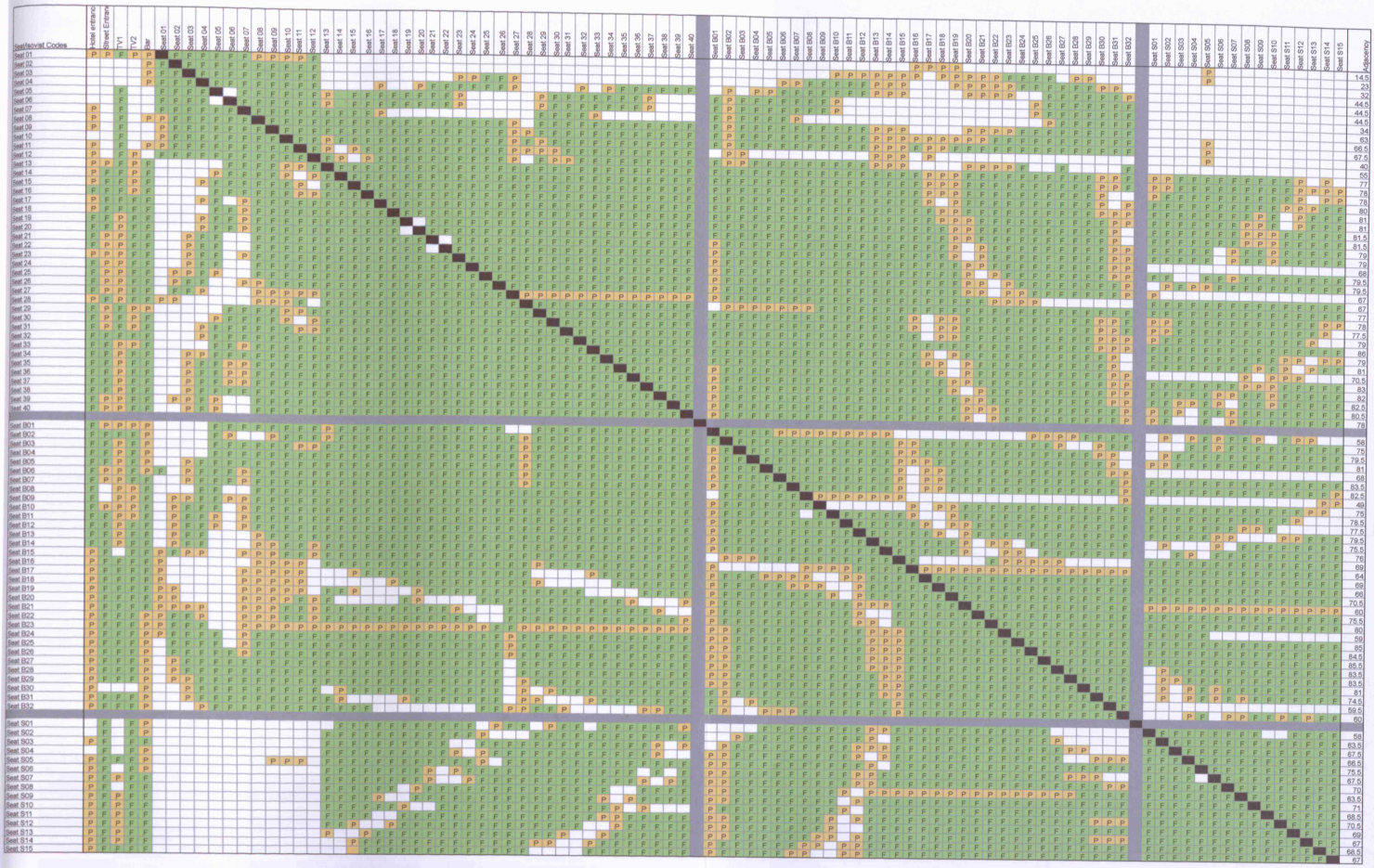
Appendix B.2.
Isovist Area

Seat codes descending (standing position eye-level)	Full Isovist (+grey) (m^2)
Standing 10	288.56
Seat B14	286.41
Seat 22	286.07
Seat 26	284.85
Seat 27	283.66
Standing 11	281.26
Seat B15	280.47
Seat 39	278.33
Seat 40	277.95
Seat 28	275.77
Seat 25	275.24
Seat B09	275.1
Seat 21	274.83
Seat 37	274.29
Seat 38	274.27
Seat B10	273.74
Seat B08	273.59
Seat 24	273.52
Standing 09	272.08
Seat S15	272.03
Seat 36	271.94
Standing 06	271.21
Seat 23	271.15
Standing 08	270.96
Seat B13	270.24
Seat B17	269.69
Seat 35	269.42
Seat 20	269.39
Standing 12	269.36
Seat B07	267.52
Seat S14	267.41
Seat B06	267.13
Standing 07	266.81
Seat 32	266.52
Seat 34	265.87
Seat 19	265.77
TV2	264.97
Seat B11	264.44
Seat 31	264.32
Bar	262.96
Seat S13	262.57
Standing 05	262
Seat 18	261.99
Seat B05	261.55
Seat 17	261.34
Seat S08	259.67
Seat B23	259.55
Seat 15	258.85
Seat B16	258.37
Seat B22	258.08
Seat S10	256.72
Seat 33	256.3
Seat S09	256.17
Seat S06	255.56
Seat S07	253.41
Seat 30	253.35

Appendix B.2.
Isovist Area

Seat codes descending (standing position eye-level)	Full Isovist (+grey) (m^2)
Seat B18	253.27
Seat B12	251.41
Seat S04	251.01
Seat S12	250.97
Seat B25	250.78
Seat B24	250.55
Seat S11	249.46
Seat 29	248.12
Seat 16	248.07
Seat B21	247.92
Standing 04	247.59
Seat S05	246
Seat B02a	243.97
Seat B26	242.65
Seat S03	242.65
Seat B04	242.05
Standing 03	241.99
Seat B20	239.5
Seat 14	239.48
Seat B03	239.44
Seat B02	233.44
Seat B19	225.86
Seat B27	223.55
Seat 13	219.76
Standing 13	213.37
Street Glazing	211.79
Seat S02	211.28
TV1	207.45
Seat B28	205.31
Seat B29	198.24
Main (hotel) entrance	197.52
Seat S01	193.69
Standing 02	183.78
Seat B01	182.46
Seat B30	175.03
Seat 11	172.56
Seat 09	171.42
Seat 08	170.69
Seat 12	164.64
Seat 10	163.79
Seat B31	154.94
Seat B32	152.5
Standing 01	147.15
Seat 05	134.95
Seat 06	134.95
Street Entrance	102.91
Seat 07	97.57
Seat 04	68
Seat 03	48.25
Seat 02	31.53
Seat 01	13.79

Appendix C. Adjacency Matrix



Melisa Chan
MSc Advanced Architectural Studies Thesis 2007

Seat Codes	Adjacency (Full)
Seat 32	84
Seat B26	81
Seat B24	80
Seat B25	80
Seat B27	79
Seat B28	79
Seat B06	78
Seat 19	77
Seat 20	77
Seat 36	77
Seat 38	77
Seat B07	77
Seat 17	76
Seat 18	76
Seat 34	76
Seat 37	76
Seat B04	76
Seat 16	75
Seat 24	75
Seat B29	75
Seat 21	74
Seat 22	74
Seat 33	74
Seat 39	74
Seat B03	74
Seat B10	74
Seat B12	74
Seat B22	74
Seat 25	73
Seat 31	73
Seat 40	73
Seat 15	72
Seat B11	72
Seat 29	71
Seat 30	71
Seat B13	71
Seat B14	71
Seat S05	71
Seat 13	70
Seat 14	70
Seat 28	70
Seat B02	70
Seat B09	69
Seat B21	69
Seat B30	68
Seat S09	67
Seat S10	65
Seat S11	65
Seat S12	65
Seat 35	64
Seat B19	64
Seat S07	64
Seat S15	64
Seat 23	63
Seat B05	63
Seat S03	63
Seat S14	63
Seat 10	62
Seat S06	62
Seat 26	61
Seat B15	61
Seat B17	61
Seat S02	61
Seat S04	61
Seat S13	60
Seat 09	59
Seat B18	59
Seat 08	57
Seat S01	55
Seat 27	54
Seat B31	54
Seat S08	53
Seat B32	51
Seat B16	50
Seat 12	47
Seat B01	46
Seat B20	45
Seat B08	43
Seat 05	41
Seat 06	41
Seat B23	39
Seat 04	36
Seat 11	32
Seat 07	31
Seat 03	24
Seat 02	15
Seat 01	8

Key:

	Table BT2
	Table BT3
	Table BT4
	Table BT5
	Table BT6
	Table BT7
Seat B26	Highest "Full" adjacency for low-bench seating
Seat 32	Highest "Full" adjacency for all seating types
Seat 01	Lowest adjacency for all seats

Seat Codes	Adjacency (Full+Partial)
Seat B24	90
Seat B26	90
Seat 36	89
Seat B06	89
Seat B25	89
Seat 32	88
Seat 37	88
Seat 38	88
Seat B07	88
Seat B27	88
Seat B28	88
Seat 39	87
Seat B29	87
Seat 14	86
Seat 17	86
Seat 18	86
Seat 19	86
Seat 20	86
Seat 25	86
Seat 34	86
Seat B04	86
Seat B22	86
Seat 16	85
Seat 29	85
Seat 31	85
Seat B03	85
Seat B12	85
Seat 13	84
Seat 15	84
Seat 21	84
Seat 22	84
Seat 24	84
Seat 28	84
Seat 30	84
Seat 33	84
Seat 40	83
Seat B10	83
Seat B11	83
Seat B21	82
Seat B09	81
Seat B14	81
Seat B30	81
Seat 27	80
Seat B02	80
Seat B13	80
Seat S05	80
Seat B23	79
Seat B16	78
Seat 35	77
Seat B15	77
Seat B17	77
Seat B19	77
Seat S07	76
Seat S11	76
Seat B20	75
Seat S09	75
Seat 09	74
Seat S08	74
Seat S13	74
Seat S14	74
Seat 10	73
Seat 23	73
Seat 26	73
Seat B05	73
Seat B18	73
Seat S06	73
Seat S12	73
Seat S03	72
Seat S04	72
Seat S10	72
Seat B01	70
Seat S15	70
Seat 08	69
Seat B32	69
Seat S02	66
Seat B31	65
Seat 12	63
Seat S01	61
Seat B08	55
Seat 04	53
Seat 05	48
Seat 06	48
Seat 11	48
Seat 03	40
Seat 07	37
Seat 02	31
Seat 01	21

Key:

	Table BT2
	Table BT3
	Table BT4
	Table BT5
	Table BT6
	Table BT7
Seat B24+B26	Highest "Full + Partial" adjacency for low-bench seating
Seat 36	Highest "Full + Partial" adjacency for banquette seating
Seat 01	Lowest "Full + Partial" adjacency

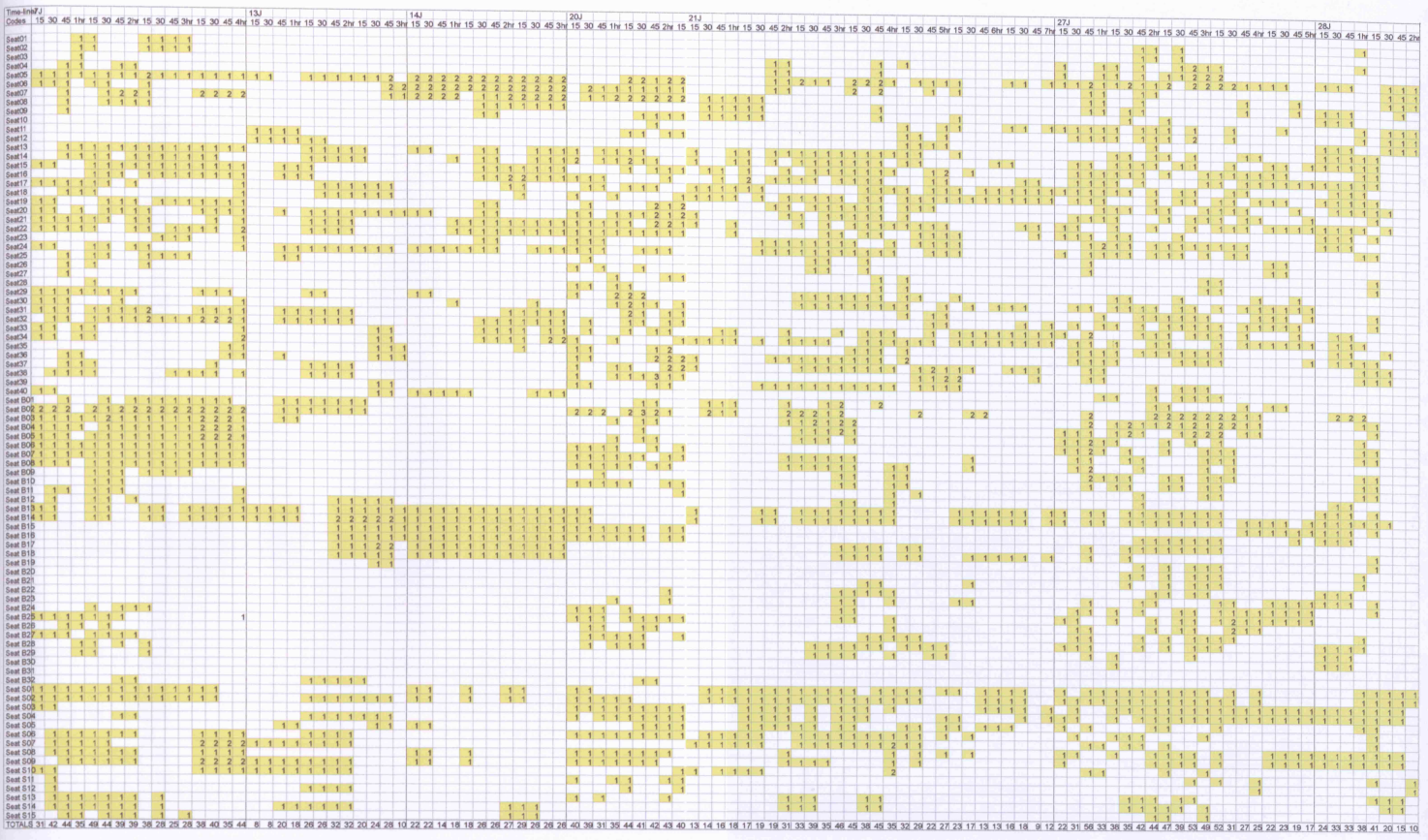
Seat Codes	Adjacency** (Normalised)
Seat 32	86
Seat B26	85.5
Seat B24	85
Seat B25	84.5
Seat B06	83.5
Seat B27	83.5
Seat B28	83.5
Seat 36	83
Seat 38	82.5
Seat B07	82.5
Seat 37	82
Seat 19	81.5
Seat 20	81.5
Seat 17	81
Seat 18	81
Seat 34	81
Seat B04	81
Seat B29	81
Seat 39	80.5
Seat 16	80
Seat B22	80
Seat 24	79.5
Seat 25	79.5
Seat B03	79.5
Seat B12	79.5
Seat 21	79
Seat 22	79
Seat 31	79
Seat 33	79
Seat B10	78.5
Seat 14	78
Seat 15	78
Seat 29	78
Seat 40	78
Seat 30	77.5
Seat B11	77.5
Seat 13	77
Seat 28	77
Seat B14	76
Seat B13	75.5
Seat B21	75.5
Seat S05	75.5
Seat B02	75
Seat B09	75
Seat B30	74.5
Seat S09	71
Seat 35	70.5
Seat B19	70.5
Seat S11	70.5
Seat S07	70
Seat B15	69
Seat B17	69
Seat S12	69
Seat S10	68.5
Seat S14	68.5
Seat 23	68
Seat B05	68
Seat 10	67.5
Seat S03	67.5
Seat S06	67.5
Seat 26	67
Seat 27	67
Seat S13	67
Seat S15	67
Seat 09	66.5
Seat S04	66.5
Seat B18	66
Seat B16	64
Seat S02	63.5
Seat S08	63.5
Seat 08	63
Seat B20	60
Seat B32	60
Seat B31	59.5
Seat B23	59
Seat B01	58
Seat S01	58
Seat 12	55
Seat B08	49
Seat 04	44.5
Seat 05	44.5
Seat 06	44.5
Seat 11	40
Seat 07	34
Seat 03	32
Seat 02	23
Seat 01	14.5

Key:

	Table BT2
	Table BT3
	Table BT4
	Table BT5
	Table BT6
	Table BT7
Seat B26	Highest "Normalised" adj for low-bench seating
Seat 32	Highest "Normalised" adj for all seating types
Seat 01	Lowest "Normalised" adja

Melisa Chan
Advanced Architectural Studies Thesis 2007

Appendix D.1 Occupancy Matrix.



Melisa Chan
MSc Advanced Architectural Studies Thesis 2007

Appendix D.1 Occupancy Matrix.

Melisa Chan
MSc Advanced Architectural Studies Thesis 2007

Appendix D.1 Occupancy Matrix.

Time-line / Codes	15	30	45	1hr	15	30	45	2hr	15	30	45	3hr	15	30	45	4hr	15	30	45	5hr	15	30	45	6hr	15	TOTAL occupancy
Seat01								1							2											14
Seat02				1		1	1	1						2										1	1	13
Seat03				1	1	1	1	2	1	1	1	1				1								1	1	30
Seat04				1			1	1					1	1	1	1	1	1	1	1	1	1				64
Seat05				1		1	1	1												1	1	1		1		193
Seat06					1			1	1	1														1		104
Seat07								1			1		1	1	1	1	1			1	1		1	1		95
Seat08	1			1				1	1		1		1	1	1	1	1	1	1	1	1				1	65
Seat09	1			1	1	1		1	1				1	1			1	1	1	1	1		1		1	55
Seat10			1		1	1	1	1	1	1	1					1	1			1	1	1		1	1	73
Seat11			1	1	1	1	1	1	1	1	1	1				1	1			1				1		76
Seat12				1		1	1			1	1					1	1							1	1	55
Seat13			1	1	1	1	1	1	1	1	1		1	1												100
Seat14			1	1		1	1	1	1				1	1	1			1								105
Seat15				1	1	1	1		1	1	1	1		1	1	1	1									127
Seat16			1		1		1	1		1	1		1		1		1	1	1	1						125
Seat17					1	1	1		1	1	1		1			1										109
Seat18			1	1			1		1	1	1									1						108
Seat19						1	2	1	1	1	1									1	1	1	1	1	1	112
Seat20	1	1	1	1	1	1	2	1	1		1									1	1	1	1	1	1	116
Seat21			1	1			1	2	1	1		1	2			1	1			1	1	1	1	1	1	133
Seat22			1	1	1	1	2	1	1	1	1	1	2			1	1	1	1	1	1	1	1	1	1	122
Seat23				1	1	1	2	1	1	1	1	1	1	1	1				1	2	2	2				109
Seat24							1	1	1	1	1	1	1	1	1				1	1	1	1				93
Seat25						1	1	1	1		1	1													1	34
Seat26						1	1	1	1		1	1	1										1		1	37
Seat27								1					1													12
Seat28								1					1													13
Seat29				1			1																			51
Seat30						1	1	1													1					66
Seat31			1		1	1			1		1	1									1					99
Seat32			1				1	1	1		1		1		1	1	1	1	1	1	1					118
Seat33								1	1	1	1		1		1	1			1	1	1					95
Seat34								1	1	1																95
Seat35								1	1		1		1	1	1	1	1	1								70
Seat36							1	1	1		1			1	1	1	1	1					1		1	92
Seat37								1	1		1	1	1	1			1	1	1	1			1	1	1	82
Seat38					1	1	2	1					1				1	1	1	1			1	1	1	73
Seat39																				1		1	1			49
Seat40													1						1	1	1					28
Seat B01			1	1			1	1			1		1					1								62
Seat B02			1	1		2	2	1		1	2	1	1			2	2	2	2	1	1		2			182
Seat B03						1	1		1			2	1						1	1				1		97
Seat B04			1	1	1	1	2	1	1															1		94
Seat B05			1	1	1		1					1						1								70
Seat B06			1	1	1	1		2	1	1	1						2	1								54
Seat B07						1		1	1	1	1	1					1									59
Seat B08							1		1			1	1	1		1										57
Seat B09					1		1	1			1	1	1		1		1				1	1		1		58
Seat B10					1	1	1	1		1	1								1		1	1	1	1		61
Seat B11						1				1	1	1					1		1		1		1			47
Seat B12			1	1	1		1	1			1	1	1	1				1		1						44
Seat B13	1		1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1				1			124
Seat B14	1	1			1				1			1	1	1	1	1	1	1	1	1	1			1	1	144
Seat B15					1				1				1			1	1			1	1			1	1	62
Seat B16								1	1	1			1			1	1		1	1				1		51
Seat B17								1		1	1			1								1				57
Seat B18											1	1		1		1	1	1	1			1				68
Seat B19												1			1											23
Seat B20							1								1	1										17
Seat B21					1	1	1			1						1										19
Seat B22					1	1	1	1		1																29
Seat B23								1																		33
Seat B24											1															40
Seat B25				1	1						1	1	1													49
Seat B26				1	1	1		1	1			1	1			1										28
Seat B27						1	1	1	1				1													38
Seat B28						1		1			1															43
Seat B29								1			1															31
Seat B30																										10
Seat B31									1				1													7
Seat B32									1				1													15
Seat S01	1	1	1	1	1	1	1	1	1		1	1	1	1	1		1	1	1							125
Seat S02	1	1	1	1	1	1	1	1	1		1	1	1		1	1	1	1	1	1						141
Seat S03	1	1	1	1	1	1	1	1	1			1	1	1		1	1		1	1						100
Seat S04	1	1	1	1	1	1				1			1		1	1	1			1						98
Seat S05	1	1		1	1	1				1				1	2	1	1			1						54
Seat S06			1		1	1	1	1		1	1	1	1	1	1	1			1							105
Seat S07				1	1	1	1	1	1							1		1		1						84
Seat S08			1	1		1		1		1	1	1		1	1		1									95
Seat S09						1		1	1	1			1	1		1				1						97
Seat S10							1	1																		37
Seat S11						1	1			1	1	1					1	1				1				51
Seat S12	1	1				1	1			1	1		1		1	1	1		1			1				41
Seat S13			1		1		1	1	1	1	1	1		1	1		1	1		1						72
Seat S14	1	1			1		1	1	1		1		1			1				1						66
Seat S15	1	1									1											1				21
TOTALS	13	10	25	31	36	45	59	58	40	41	48	33	42	25	28	33	34	27	32	29	19	15	12	21	17	

Appendix D. Observations

D.2.1. Stills taken from video observation footage: July.

Still image of different small-group positions, 9.30pm; 7 July 2007.

Still image of different small-group positions, 10.30pm; 7 July 2007.

Still image of different small-group positions, 9.30pm; 13 July 2007.

Still image of different small-group positions, 10pm; 13 July 2007.

Still image of different small-group positions, 12am; 13 July 2007.

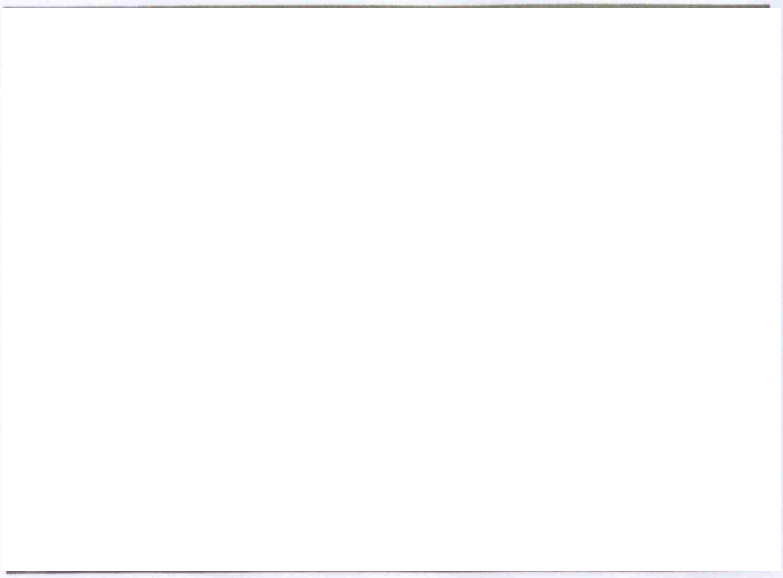
Still image of different small-group positions, 11pm; 20 July 2007.

Still image of different small-group positions, 1am; 20 July 2007.

Still image of different small-group positions, 10pm; 28 July 2007.

Still image of different small-group positions, 11pm; 28 July 2007.

Still image of different small-group positions, 12am; 28 July 2007.



Still image of different small-group positions, 1am; 28 July 2007.

Still image of different small-group positions, 2am; 28 July 2007.

D.2.2. Sample sequence of image stills showing the morphology of group orientation over time (at unequal intervals), taken from video footage between 10pm to 4am, July - August 2007.

4am; 4 August 2007

10pm; 10 August 2007

Melisa Chan
Advanced Architectural Studies Thesis 2007

_____4am, 11 August 2007

Melisa Chan
Advanced Architectural Studies Thesis 2007

Bibliography

Aczel, A. D. (2005), *Chance: A Guide to Gambling, Love, the Stock Market and Just about Everything Else*, High Stakes Publishing, London.

Argyle, M. (1978), *Social Interaction*, Tavistock Publications, London.

Batchelor, J. P. and Goethals, G. R. (1972), "Spatial Arrangements in Freely-Formed Groups", *Sociometry*, Vol. 35, No. 2, Mar. 1972, pp. 270-279.

Braaksma, J. P. and Cook, W. J. (1980), "Human Orientation in Transport Terminals", *Transportation Engineering Journal*, March 1980, 106, TE2, pp. 189-203.

Canetti, E. (1984), *Crowds and Power*, Farrar, Straus and Giroux, New York.

Crompton, A. (2000), "The Fractal Nature of the Everyday Environment", *Environment and Planning B: Planning and Design*, 2001, Vol. 28, pp. 243 - 254.

Griffiths, S. and Quick, T. (2005), "How the Individual, Society and Space become Structurally Coupled over time", *5th Space Syntax Symposium Proceedings*, Delft 2005, Techne, Vol. 2, pp 447 - 457.

Hall, E. T. (1966), The Hidden Dimension, Garden City, New York.

Hillier, B. (1996), *Space is the Machine*, Cambridge University Press, Cambridge.

Hillier, B. and Hanson, J. (1984), *The Social Logic of Space*, Cambridge University Press, Cambridge.

Hillier, B. and Leaman, A. (1973), "The man-environment paradigm and its paradoxes", *Architectural Design*, August, pp. 507-511.

Ittelson, W. H. and Proshansky, H. M. (1974), *An Introduction to Environmental Psychology*, Holt, Rhinehart and Winston, New York.

Kimes, S. E. and Robson, S. K. A. (2004), "The Impact of Restaurant Table Characteristics on Meal Duration and Spending", *Cornell Hotel and Restaurant Administration Quarterly*, No. 45, pp. 333-346.

McClelland, J. S. (1989), *The Crowd and the Mob: from Plato to Canetti*, Unwin Hyman, London. Ch. 10: The Sanity of Crowds and the Madness of Power: Elias Canetti's *Crowds and Power*, pp. 293-325.

Mehrabian, A. and Diamond, S. G. (1971), "Seating Arrangement and Conversation", *Sociometry*, Vol. 34, No. 2, Jun. 1971, pp. 281-289.

Miller, G. A. (1956), "The Magic Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information", *Psychological Review*, Vol. 63, pp. 81-97.

Modak, S. K. and Patkar, V. N. (1984), "Transport Terminal Design and Passenger Orientation", *Transport Planning and Technology*, 1984, Vol. 9, pp. 115-123.

Oldenburg, R. (1999), *The Great Good Place*, Marlowe and Company, New York.

Patterson, M. L., Kelly, C. E., Kondracki, B. A. and Wulf, L. J. (1979), "Effects of Seating Arrangement on Small-Group Behaviour", *Social Psychology Quarterly*, Vol. 42, No. 2, Jun. 1979, pp. 180-185.

Propst, D. B. and Kurtzz, M. E. (1989), "Percieved Control/reactance: A Framework For Understanding Leisure Behaviour in Natural Settings", *Leisure Studies* 8, 1989, E. & F.N. Spon, pp. 241-248.

Proshansky, H. M. (1974), "Theoretical Issues in Environmental Psychology, The School Review", *Learning Environments*, Vol. 82, No. 4, Aug. 1974, pp. 541-555.

Proshansky, H. M., Ittelson, W. H., and Rivlin, L. G. (1970), *Environmental Psychology: Man and his Physical Setting*, Holt, Rhinehart and Winston, New York.

Regoeczi, W. C. (2002), "The Impact of Density: The Importance of Nonlinearity and Selection on Flight and Fight Responses", *Social Forces, The University of North Carolina Press*, Dec. 2002, 2, 81, pp. 505-530.

Robson, S. K. A. (1999), "Turning the Tables: The Psychology of Design for High-volume Restaurants", *Cornell Hotel and Restaurant Administration Quarterly*, No. 40, pp. 56-63.

Sommer, R. (1959), "Studies in Personal Space", Sociometry Vol. 22, Sep. 1959, pp. 247-260.

Sommer, R. (1962), "The Distance for Comfortable Conversation: A Further Study", Sociometry Vol. 25, Mar. 1962, pp. 111-116.

Turner, A. (2003), "Analysing the visual dynamics of spatial morphology", *Environment and Planning B: Planning and Design*, 2003, Vol. 30, pp. 657-676.

Turner, A. (2004), "Visibility Graph Analysis", The Bartlett School of Graduate Studies, University College London, www.vr.ucl.ac.uk/research/vga.

Whyte, W. H. (1980), The Social Life of Small Urban Spaces, The Conservation Foundation, Washington D.C.